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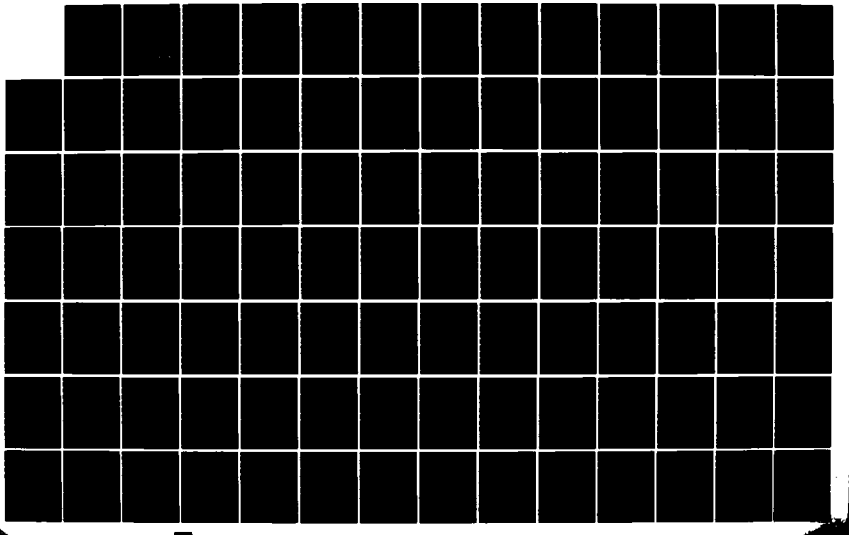

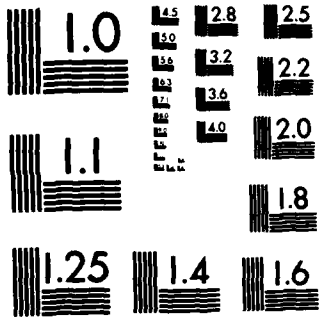

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PROLIFERATION OF SMALL NUCLEAR FORCES

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1800 K Street NW, Suite 400
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Technical Report

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The objective of this study is to identify and assess the implications of the proliferation of nuclear forces in the Middle East and South Asia for U.S. security interests, policies, and planning. To fulfill this objective, this study seeks to:

1) Project the potential size and capabilities of local nuclear forces, and define the spectrum of threats that such forces could pose to the security interests of the U.S. and of other important actors, both in this region and elsewhere;

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20. ABSTRACT (Continued)

2) Assess the probable impact of proliferating nuclear forces on international stability, military balances, the character of conflict, arms control issues, conventional arms competition and U.S. forces;

3) Assess how new nuclear powers will behave and how their neighbors and other nuclear powers will react;

4) Assess Soviet perception and response;

5) Identify the likely patterns and outcomes of nuclear and other military interaction, including perceptions, use of leverage, employment of force, conflict escalation, nuclear warfare, and crisis management, within and beyond the region of concern;

6) Discuss the implications for U.S. defense policy and planning, indicating areas in which future preparation or decisions may be called for.

THE PROLIFERATION OF SMALL NUCLEAR FORCES IN THE MIDDLE EAST AND SOUTH ASIA: IMPLICATIONS FOR U.S. DEFENSE PLANNING

EXECUTIVE SUMMARY

The Problem

Nuclear proliferation presents special problems for U.S. security interests and defense planning in the Middle East and South Asia. The added risks in terms of potential losses to U.S. forces, damage to allied nations, and possible escalation to superpower confrontation and conflict are immense. Proliferation threats are not controlled by the careful process of deterrence now established between the superpowers, nor are they seriously considered in defense plans for regional conflict with the Soviet Union. Small nuclear forces (SNFs) in the hands of regional states can present the U.S. with a wide range of contingencies that its forces have not been designed to fight.

Potential Regional Nuclear Powers, 1990-2010

A small nuclear force (SNF) would comprise at a minimum from 5 to 10 deliverable and militarily serviceable fission bombs or warheads, though it could be much larger and even fairly sophisticated. The strategic significance and destabilizing effects of SNF proliferation will be more profound with the shift from zero to 5 or 10 weapons than from subsequent increases.

In local perceptions, Israel is already a nuclear power. India has demonstrated a nuclear explosive device and Pakistan appears to be on the verge of nuclear explosive capability. Certainly Israel and India, and probably Pakistan, could deploy a SNF before 1990. The probability is high that India and Pakistan will do so, and this in turn may stimulate proliferation in the Gulf and Middle East. Other possible SNF candidates in the 1990s or by the turn of the century include Iraq, Libya, Egypt and Syria in the Arab world, and Iran in the Gulf.

Most regional SNFs would rely for delivery systems mainly on high performance tactical aircraft, which are widely distributed in the region now and which will increase both in number and sophistication in coming decades. Eventually, some states may diversify SNF delivery with tactical ballistic missiles (India and Israel are the most likely candidates in the near term, while Iraq, Egypt, Syria, Libya and Iran are conceivable in the long term, though Soviet assistance to one or more of the latter could advance the estimate). Unconventional military delivery is also possible.

Regional Nuclear Threats and Conflict Potential

In the Middle East, the small physical size or concentration of population in small areas and the importance of capital cities for national identity means that a minimal SNF could threaten national survival, a fact that would make SNF appearance immensely destabilizing. Oil and other physical assets could also be destroyed more thoroughly and quickly by SNFs than by conventional forces.

A key unresolved issue is the extent to which states in this region will operate according to "rational" norms (as understood in the West) with respect to the possession and use of nuclear weapons. Most leaders are likely to come to power with priorities and goals clearly related to the importance of national survival (and therefore considered rational by our standards), yet some priorities and goals could be so different from our own as to make our second-guessing their behavior very difficult at best. To achieve such priorities or goals, those leaders could behave in an "irrational" manner, for example, by attempting nuclear blackmail to coerce a regional state or a major power to concede extreme demands.

SNF proliferation will increase the risk of nuclear war in the region. Local nuclear war could arise from the escalation of traditional conflict, from SNF-induced instability in military balances, alignment shifts and domestic politics, or from technical and organizational deficiencies in command and control arrangements.

SNF Threats to U.S. Military Forces and Operations in the Region

A SNF-equipped country could threaten to disrupt U.S. regional projection of military power by (1) intimidating host countries that provide base or transit facilities for U.S. forces; (2) preempting host country bases or facilities before the arrival of U.S. forces; (3) preemptively attacking U.S. forces and equipment concentrated in regional bases or staging areas; (4) attacking U.S. forces in the theater; (5) destroying value targets (e.g., oil) that the U.S. intended to secure; and (6) inhibiting U.S. decisionmakers from exercizing force projection options because of the nuclear risks entailed.

Most military operations can be halted and recovery hindered by modern conventional weapons, but nuclear weapons offer the attacker greatly increased strike power by (1) lowering the sortie rate; (2) creating a synergism of effects; (3) increasing the destructive magnitude and inhibiting recovery; and (4) lowering the susceptibility to active and passive defense, and (5) dramatically intensifying the psychological effects on decisionmaking.

Implicit Effects of SNFs on U.S. Military Operations

SNFs would greatly complicate U.S. contingency response if, in a regional emergency, a Soviet client and/or proxy possesses a SNF, if the target of Soviet (or proxy) military action is SNF-equipped, or if both the proxy and target have SNFs. A U.S. ally with a SNF could

pose perplexing problems if the ally threatens to use its SNF unless the U.S. intervenes to neutralize some military threat. Pakistan or Israel, for example, might threaten to use nuclear weapons against encroaching Soviet forces unless the U.S. intervenes to block the Soviet advance by conventional means.

Western Alliance Issues

SNF proliferation in the Middle East could have destabilizing effects on the Alliance by (1) threatening individual members directly and/or their respective oil supplies (the latter of which could undermine economic strength, and ultimately, defense capacity); (2) giving added impetus to the anti-nuclear movement; and (3) stimulating nuclear weapons considerations in particular NATO members, initially in the southern flank, but possibly in West Germany. The last prospect could be especially destabilizing to the East-West balance.

Soviet Perception and Response

Soviet responses to SNF proliferation in a neighboring region could lead to Soviet involvement in proxy relationships with SNF powers, deeper military involvement in the region generally, and augmented military capabilities. The latter could have an impact on U.S. military planning for strategic and arms control objectives as well as regional contingencies. Soviet-SNF proxy relationships and deeper Soviet military involvement in the region may increase the likelihood of superpower crisis and confrontation.

Defense Planning and Policy Implications

SNF threats may raise new defense policy questions of fundamental importance including (1) whether or when nuclear security guarantees are offered local allies or host states which face SNF threats; (2) what kind of response to make to direct SNF threats to U.S. forces in the region; and (3) how to reconcile the trade-offs among "preventing" SNF proliferation, "stabilizing" SNFs after the fact, and "deterring" or "defending" against actual SNF threats to U.S. interests or forces. The costs of stabilizing and defending in a SNF environment are likely to be greater than preventing such an environment from materializing.

SNF scenarios raise additional requirements for long lead time defense planning in three areas: (1) intelligence and C3I; (2) regional nuclear war planning software; and (3) deployment capabilities. With respect to intelligence and C3I, improvement is needed of U.S. ability to identify the source, accurately characterize, and analyze the effect of nuclear strikes in the region. Improved intelligence capability also is needed to identify the vulnerabilities of SNFs as they develop over time. In the software for regional nuclear war, the U.S. will need pre-planned conventional strike and other defense options for SNF contingencies, and means to preclude Soviet miscalculation or escalation. As to appropriate deployment capability, the U.S. needs to plan for greater

dispersal of air and C I support bases and equipment, and greater sophistication and capacity in sealift as well as seabased propositioning.

Incremental efforts in U.S. defense planning also would be appropriate, including: (1) improved capability emphasizing greater firepower for theater missions; (2) increased air strike and lift range; (3) improved nuclear training, doctrine and equipment for tactical applications; and (4) effectively integrated assets for extended deterrence and conventional strike operations.

SNF scenarios which could aggravate or instigate superpower confrontations imply the need for advanced defense policy thinking about crisis management approaches and mechanisms that would reduce the likelihood of catalytic effects or conflict escalation to the nuclear level.

Conclusions

It is not clear that existing U.S. force plans and defense goals for the region take account of possible SNF threats and contingencies either in terms of their political and psychological impact on decisionmaking processes or their physical effects on military forces and operations. Resource constraints on the implementation of existing plans probably preclude major weapons systems acquisitions dedicated to SNF contingencies at this time, but those constraints do not preclude new thinking about how existing or planned equipment and resources can be employed more flexibly in SNF contingencies. For defense planners to develop new employment plans for such contingencies, however, they will need additional guidance based on advanced thinking at a policy level that resolves issues about appropriate response to SNFs in foreseeable contingencies.

PREFACE

The Center for Strategic and International Studies of Georgetown University agreed in January 1982 to launch this year long study of the U.S. defense planning implications of nuclear proliferation in the Middle East and South Asia.

The methodology of the study was to distill from the knowledge and views of leading experts gathered in workshops a series of quantitative and qualitative judgments about the rate, scope and probable impact of proliferation in this region on U.S. security interests. The selection of experts was designed to provide an interplay of high-level technical, political, and area specialist knowledge, representing individuals from a cross-section of national laboratories, universities and research institutions. A list of participants may be found in Appendix A.

Dr. Rodney W. Jones, the CSIS Project Director, in consultation with his colleagues, conceptualized the study, provided the outline of topics for workshop preparation, solicited the preparation of data for each workshop, selected workshop participants and discussion leaders, and moderated the actual discussion. The substance of workshop discussion was organized and recorded in the form of digests for participant review and as a resource for report compilation. Jeff Sands, Assistant to the Director, was rapporteur.

The resulting report benefits from the composite of workshop discussions but does not necessarily represent a consensus view of the experts who participated in the workshops or in the project as a whole. The report has been prepared by the CSIS Project Director and integrates what the author believes were the most salient findings and observations of the workshops, together with his own knowledge and search of the literature, and related staff support. Participants in the project are not responsible for the overall results which appear in the final report, though individual contributions are acknowledged at various points and Appendix D (Illustrative Force Sizing and Requirements Scenarios) was authored by Anthony Cordesman.

The Project Director wishes to express his special appreciation to those participants who submitted extensive background information for the project, namely, Arnold Kramish, Maurice Eisenstein, Robert Selden, Robert Barker, Richard Speier, Robert Hunter, Kenneth Myers, Thomas Blau, Stephen Meyer, Ty Cobb, Sid Graybeal, George Quester, and Anthony Cordesman. Special tributes also are due to certain CSIS staff for administrative or advisory support, including: Amos A. Jordan, President; William Taylor, Chief Operating Officer; Robert Kupperman, Director, Science and Technology; David Williamson, Senior Fellow in Science and Technology; and Michael Freney, Senior Fellow in Political-Military Studies. Finally, the Director is greatly indebted to Stacia Ganas and Jeff Sands on his personal staff.

The report was prepared under contract for the Defense Nuclear Agency exclusively from unclassfied sources. The report, however, does not necessarily reflect the views of the Defense Nuclear Agency or of the United States Government.

Rodney W. Jones
March 16, 1984

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INTRODUCTION

The objective of this study is to identify and assess the implications of the proliferation of nuclear forces in the Middle East and South Asia for U.S. security interests, policies, and planning. To fulfill this objective, the study seeks to:

- o project the potential size and capabilities of local nuclear forces, and define the spectrum of threats that such forces could pose to the security interests of the United States and of other important actors, both in the region and elsewhere;
- o assess the probable impact of proliferating nuclear forces on international stability, military balances, the character of conflict, arms control issues, conventional arms competition and U.S. forces;
- o assess how new nuclear powers will behave and how their neighbors and other nuclear powers will react;
- o assess Soviet perception and response;
- o identify the likely patterns and outcomes of nuclear and other military interaction, including perceptions, use of leverage, employment of force, conflict escalation, nuclear warfare, and crisis management, within and beyond the region of concern;
- o and, finally, to discuss the implications for U.S. defense policy and planning, indicating areas in which future preparation or decisions may be called for.

Background

Nuclear proliferation refers to the multiplication of nuclear weapons. The term is used in two ways. Horizontal proliferation means the geographical spread of nuclear weapons, i.e., to additional countries. Vertical proliferation refers to the increasing numbers of nuclear weapons in the inventories of existing nuclear weapon powers. This report is concerned with the first phenomenon, namely, horizontal or geographical proliferation of nuclear weapons in the Middle East and South Asia.

Nuclear proliferation entails a spectrum of dangers, some of lesser magnitude, others of great severity, and some that would be globally catastrophic. The probabilities of specific threats in this spectrum cannot be stated with certainty but neither can those threats be wished away.

Preventing the further spread of nuclear weapons has been an important U.S. national security policy concern throughout the postwar period. The locus of primary concern has shifted over time from Western Europe and Japan -- where proliferation trends appeared by the mid-1970s to have been halted -- to the developing countries. Proliferation trends in the developing countries became particularly serious during the last decade, as evidenced by India's detonation of a nuclear explosive device in May 1974. Just before that event, the concurrent Arab oil embargo and Arab-Israeli war of October 1973 drew attention to the grave international security problems of this region and the added potential for destabilization as a result of nuclear weapons spread in the region.

The next few years brought further deterioration of security and nonproliferation conditions in this region, including evidence of Pakistan's drive for a nuclear weapons capability to counter India's, the possible association of proliferation in Pakistan with an "Islamic bomb," the Islamic fundamentalist revolution in Iran, the Soviet moves in the Horn of Africa and Afghanistan, the Iran-Iraq war, and the recent Israeli raid on nuclear facilities in Iraq.

In view of this serious regional instability, there is a need to update assessments of proliferation in this region. Moreover, given the growing importance in U.S. military planning of contingencies which could require the deployment of substantial U.S. military forces to this region, the appeal of including in such an assessment analysis of the potential impact of nuclear proliferation on U.S. military forces and operations planned for this region seems especially strong. Such an assessment makes the costs of proliferation more tangible for defense planners. In so doing, it may enhance vigilance and contribute to the improvement of U.S. military preparedness and flexibility for contingencies. Enhancing the effectiveness of U.S. military response to the crises of a potentially proliferated environment also may pay nonproliferation dividends.

Assumptions

It was assumed for purposes of the study that the U.S. has and will continue for the foreseeable future to have sufficiently important interests in the region of the Middle East and South Asia to develop and maintain capabilities for the deployment of substantial military forces and the conduct of multi-service operations in the region. It was also assumed that Soviet interests in the region are likely to grow in importance for the foreseeable future.

A key assumption of the study with respect to proliferation trends is that some additional proliferation in the region is virtually certain. But since experts differ in assessing the rate of proliferation and because the pace of militarily potent proliferation (i.e., development of "small nuclear forces" that could pose direct threats to U.S. military forces and operations) appears to be somewhat slower than the rate of spread of technical nuclear

capabilities that potentially offer a nuclear weapons option, it seemed advisable to set a 30-year timeframe for the study. By that time, most would agree, it is plausible to expect that several countries in the region will develop and deploy "small nuclear forces" of interest to U.S. defense planning. In at least a few cases, such developments could come much earlier. While the study estimates when military proliferation could occur in particular countries, it is less concerned with the timing than with the impact of such proliferation whenever it may occur.

In assessing technical capabilities for SNF proliferation, this study emphasizes those capabilities associated with national development of nuclear production facilities and personnel. It does not dwell on the possibilities that a nation might acquire SNF capabilities by theft, through black markets, or indirectly via private efforts that were not sanctioned by national decisions. But neither does it rule out these possibilities.

Definition of Small Nuclear Force

The term "small nuclear force" (SNF) is relative to the currently large nuclear forces of the superpowers, and should not be confused with small nuclear weapons per se. A new nuclear power would be able to deploy initially a relatively small number of nuclear weapons. A SNF is considered at minimum to be something more than a nuclear explosive or nuclear weapons "capability." According to the working criteria of the study, a SNF would comprise at least several deliverable and otherwise serviceable fission bombs or warheads. The number might be as few as five, ten, or a dozen, but could be considerably more, even in the low hundreds. Initially, a SNF is also likely to be quite primitive, but over time could become more sophisticated. At a minimum, it must be regarded by its possessor as in some fashion militarily serviceable.

Study Limitations

It is perhaps in the nature of a conference study that some issues will get deeper or more extensive treatment than others. The treatment of newer topics also may be limited by the paucity of existing literature or previous attention. Two sections of this study are especially affected by such limitations and should be regarded as much more exploratory in nature than the other sections: one is Chapter Five on "Western Alliance Issues and Responses" and the other is Chapter Six on "Issues of Soviet Perception and Response." The chapter on Western Alliance Issues is further limited by the fact that it is restricted to Western Europe and thus does not take up the issues of perception and response to SNFs of Far East regional allies. Moreover, while China is treated as a factor in the analysis of South Asian SNF scenarios, it has not been singled out for separate treatment.

A caveat is also in order about the projections of SNF capabilities and prospective SNF candidacy in the Middle East and South Asia. Regional and country experts who have formed their own

judgments about the near term likelihood of proliferation in particular countries may be uncomfortable with certain judgments made in the report, however much they are qualified. It should be kept in mind that the report does not in any particular case actually predict proliferation but rather treats it as a contingency in order to focus on its possible effects.

PART 1—SMALL NUCLEAR FORCES: THE NUCLEAR POWERS OF 2000-2010

Chapter One

CANDIDATES AND NUCLEAR CAPABILITIES

This study is concerned with the impact on U.S. security interests of "small nuclear forces" (SNFs) in the Middle East and South Asia. At this stage, SNFs in this region can only be projected hypothetically. Even if, for example, an Israeli SNF is deemed to exist already, its size and characteristics necessarily would entail a good deal of conjecture. The same could be said of any other future SNF in the region.

Nonetheless, we can place some bounds on the problem in two ways. First, the assessment of fissile material production capabilities by country suggests a range, with approximate upper limits, on the quantity of potential warheads in a SNF.*/ Second, examination of the military history and conventional weapons procurement practices of each country is suggestive of probable SNF delivery system choices. This chapter mainly deals with the nuclear warhead numerical potentials from fissile material production. Delivery systems and other technical capabilities are taken up in chapter two.

Factors in the Pace of Proliferation

With hindsight we know that certain early estimates of the rate of proliferation greatly exaggerated the numbers of nuclear weapons states to be expected at specified dates.1/ Some believe that the overshoot in early projections was based on erroneous assumptions that technology or technical capabilities drive proliferation outcomes. Increasingly, experts recognize the importance of political variables in accounting for the slower than expected pace and specific character of contemporary proliferation.2/

1) Proliferation Definitions and Indicators

Confusion in estimates of the pace of proliferation can arise from different definitions of proliferation, or different criteria for its measurement.3/

In diplomacy, the indicator customarily accepted has been the test detonation of a nuclear weapon.4/ When nuclear detonations were conducted by the first five nuclear weapons powers, there was no ambiguity about their intent. But today there are two problems with

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* As mentioned in the Introduction, SNF capabilities, including fissile material, could be acquired by theft or procurement as well as by production in national facilities. By setting the above bounds on the problem, we are approaching it conservatively. We are not implying that other possibilities which could raise the estimates should be ruled out. At the same time, there is no way to quantify even roughly the other possibilities.

this proliferation indicator as it relates to assessing the pace of proliferation.

The first problem is illustrated by India's decision to label its 1974 nuclear detonation a "peaceful nuclear explosion."5/ Since India thereafter neither declared a nuclear weapons program nor conducted further explosive tests, a certain ambiguity has resulted in its case. The Indian case has led some to distinguish intent as a significant criterion,6/ and others to emphasize the various steps needed, usually beyond a test detonation, to develop reliable warheads, delivery systems, and command and control arrangements.7/

A second problem with the detonation indicator is that it is possible to design and build workable, early generation nuclear weapons without test detonations.8/ The reports that Israel has a "bomb in the basement" capability, if true, would seem to illustrate this possibility.9/ In such a case, the development of delivery systems and command and control arrangements may proceed to an advanced level without a demonstration of nuclear explosives or declaration of intent. It should be added, however, that military commanders normally would resist relying on or developing doctrines for the use of untested weapons.

The ambiguity about the detonation threshold has led recently to much greater emphasis in proliferation assessments on the international spread of latent nuclear weapons capabilities, particularly fissile material production capabilities in the civilian nuclear fuel cycle.10/ Latent proliferation in this region presumably has gone further and is proceeding more rapidly than proliferation measured by detonations or declarations.11/

Clearly the small nuclear force proliferation which is assessed by this study imposes a more demanding set of criteria. In terms of these SNF criteria, the pace of proliferation in the near term may seem relatively slow. But this appearance could be deceptive and should not be allowed to obscure the acquisition of proliferation "kits" or SNF building blocks which could permit conversion to actual SNFs on short notice.

2) Political Factors Slowing Proliferation

The political factors that help to account for the slow pace of proliferation thus far are much the same as those that necessarily render conjectural an effort to project the identity, size and character of small nuclear forces in this region. As noted in Figure 1, these factors are external as well as internal for proliferation candidates.12/

FIGURE 1

Political Factors Slowing Proliferation

External	Internal
o alliance relationships	o risk-avoidance in nuclear decision-making
o nonproliferation diplomacy and institutional arrangements	o uncertainties arising from actual or potential instability
o potential for deterioration of valued political and and economic relationships resulting from proliferation	o indifferent quality and low cohesion of technical administrative personnel in high technology fields

The importance of political variables in retarding the expected pace of proliferation can be illustrated by what has happened recently to Iraq and Iran. In Iran's case, the planned procurement under the Pahlavi regime of an ambitious nuclear technical base was disrupted by the Islamic fundamentalist revolution of 1979. In the Iraqi case, the political origin was external, in the form of the June 1981 Israeli air strike on the OSIRAK research reactor, a potential source of weapons-grade material.13/ In each case, the earliest date of possible proliferation by national means probably has been pushed into the decade of the 1990s. Even this judgment demands caution because it could be overturned by greater national determination, resource investment, or external technical support.

3) Factors Accelerating Proliferation

Political or military developments, or the psychology of contagion, could also accelerate proliferation. Both Iran and Iraq, for example, could draw conclusions from the experience of the present war that their interests would have been better served by the possession of nuclear forces. Overt proliferation by a key regional state could precipitate matching nuclear programs by neighbors. Active nuclear cooperation between states of the region for weapons purposes, a possibility that has not been substantiated but which some believe is implicit in the Pakistani program,14/ could advance the date of technical breakthroughs or increase the number of proliferation candidates. Finally, international supply, purchase, or theft of weapons or weapons technology cannot be ruled out.15/ These represent only some of the more obvious possibilities.

4) Pace of Proliferation in the Middle East and South Asia

The question might be asked why the pace of proliferation specifically in this region seems slow. First, it should be said that appearances may be misleading. The pace in some respects is quickening in South Asia, where India -- by one measure, i.e.,

detonation of a nuclear explosive device -- has crossed a nuclear weapons threshold, and where Pakistan is believed to have approached the same threshold.16/ It is true that in the Middle East proper, no state besides Israel today is near the nuclear threshold. But Israel is reputed to have an undeclared nuclear weapons capability (the so-called "bomb in the basement") that could be converted to weapons and deployed in a matter of hours.17/

Insofar as the pace in the region otherwise is slow,18/ it can be attributed to a combination of factors: (1) the increase since the early 1970s in the inhibitions of nuclear suppliers about sensitive nuclear exports to the Middle East; (2) the caution of many states in this region based on perceptions of the adverse consequences of proliferation; (3) the national deficiencies in scientific and administrative capability still characteristic of many states in the region; and (4) the political events referred to in section 2 above that have altered near term expectations in Iraq and Iran.

The Candidates

The identity of certain regional candidate countries for small nuclear forces has been anticipated by the preceding discussion. The development of such forces indigenously is most likely where there are strong national motivations based on insecurity, or aspirations for power and prestige, and where the requisite technical foundation is present or could be assembled.

Israel, India and Pakistan all face security threats which could result in decisions to arm themselves with nuclear weapons. Each has the technical base to be plausible near-term SNF candidates. Certainly Israel and India, and probably Pakistan, would be capable of overt deployment of nuclear weapons in the 1980s.

A larger group of countries may acquire nuclear weapons capabilities in the 1990s. The most plausible of these in terms of possible security or political motivations are Iraq and Iran in the Persian Gulf, and Libya in North Africa. Evidence of successful progress by any of these states would put pressure on certain of its neighbors to develop nuclear counter-capabilities. Syria and Saudi Arabia are the most likely to react in this way to nuclear developments in Iraq and Iran, while Egypt probably and Algeria possibly would react to Libyan proliferation.

Overt Israeli deployment of nuclear weapons or the recurrence of large-scale conventional war between Israel and the major Arab states also could stimulate nuclear weapons programs in Arab states, including Egypt and Syria. Egypt apparently tried to develop nuclear weapons capabilities in the late 1950s and 1960s.19/ Resumption of this program in the 1980s would make Egypt a credible small nuclear force candidate in the 1990s. It should be added, however, that Egypt currently seems to be one of the strongest proponents of nonproliferation in the region.

Fissile Material Production Capabilities

To produce nuclear weapons by national means, a state must produce fissile material, either plutonium (Pu-239) or highly enriched uranium (HEU, or uranium with a high concentration of U-235).20/ Technically speaking, the plutonium route is the easiest course and the more likely choice for most proliferators.21/ Some plutonium is produced as a matter of course in any uranium-fueled reactor, and information about plutonium separation (reprocessing) technology is widely available in the published literature. Uranium enrichment (isotope separation) technology, by contrast, is closely held, and the necessary machinery is both costly and difficult to fabricate, as well as expensive and demanding to operate.22/ New and more efficient enrichment technologies that are under development, such as laser-isotope separation,23/ are expected to lower the cost and technical barriers eventually. Enrichment is already a proliferation factor in this region, however, notably in Pakistan.24/ For additional discussion of the plutonium and enriched uranium routes to proliferation in terms of their applicability to this region, and of related NPT and IAEA safeguards constraints, see Appendix B.

Potential Nuclear Warhead Projections

When the parameters of fissile material production rates from nuclear reactors or other technologies are known (see Appendix B), an estimate can be made of the number of nuclear bombs or warheads that could potentially be derived. Such an estimate is strictly notional. Fissile material might not be converted into warheads, or only some of it may be. Some material may be consumed in nuclear testing, while some may be used for other purposes. The assumptions employed in the calculation themselves may be too conservative, or not conservative enough. But the estimate and resulting projections are necessary to put an upper bound on the problem.

Our estimates for near-term proliferation candidates of notional warhead annual production rates (APR) and total notional warhead projections from the present through the year 2000 is presented below in Table 1. This tabulation assumes that the warhead design is that of first generation fission weapons with expected yields of about 20 kilotons of TNT equivalent. For further discussion of the technical derivation of this data, see Appendix B, section 3 (Fissile Material and Potential Warheads).

1) India:

The potential warhead numbers are impressive, especially in the Indian case. Even assuming no resort to safeguarded stocks,*/ India

* IAEA safeguards are in force on some Indian facilities, but not on others. Thus there are safeguarded as well as unsafeguarded stocks of nuclear materials in India. Safeguards provide accounting and inspection measures to detect diversion. Confidence in the reliability of safeguards is difficult to establish when they are confined to a selection of the nuclear facilities of a particular nation.

Table 1

NATIONAL NUCLEAR WARHEAD POTENTIAL*
(critical masses of fissile material)

	1982		1990		2000	
	Annual Production Rate (APR)	Accrued Total	APR	Accrued Total	APR	Accrued Total
INDIA						
Unsafeguarded	3	57	69	395	127	1,607
Safeguarded	50	200	50	600	50	1,125
PAKISTAN						
Unsafeguarded	0	-	6	30	6	90
Safeguarded	15	150	15	270	71	980
ISRAEL						
Unsafeguarded	5.5	27	5.5	71	5.5	126
IRAQ						
Safeguarded	-	-	5.5	5.5	5.5	60

* The numbers in the columns of this table represent estimates of the "critical masses" of fissile material potentially produced by national facilities, either on an annual basis, or on an accrued basis over designated periods. Critical mass refers to the minimum quantity of a fissile material needed to achieve an explosive chain reaction. Dividing the total quantity of fissile material produced or stockpiled by the quantity for a critical mass (both quantities usually expressed as kilograms) yields a notional number of warheads, i.e., the number of warheads that could be fabricated from a given quantity of fissile material. The numbers here are upper bound estimates that assume efficient production and use of fissile material. Actual practice would not necessarily be so efficient, but this could vary considerably from one country to another. For details on derivation, see Table B.1 in Appendix B.

Accrued totals depend on the actual or assumed starting dates for particular nuclear facilities. See Table B.1 in Appendix B.

would appear today to be capable of manufacturing at least two or three dozen nuclear weapons, meeting our criteria for a small nuclear force (SNF). (For the SNF criteria, see the Introduction, page 13.) Resort to safeguarded stocks would raise the number substantially, the only limitation being the Tarapur reprocessing facility, which can handle only 100 tons of spent fuel a year. This reprocessing capacity could be fully absorbed by India's large-scale research reactors when the second reactor, R-5, comes on line. The research reactors alone could provide an annual production rate for warheads of over ten a year, giving India more than 200 by this means alone at the turn of the century. Expanded reprocessing capability, which is planned, and the introduction of unsafeguarded HWR power reactors in this decade and the next could give India a notional warhead potential of well over a thousand by the turn of the century.25/

2) Pakistan:

In Pakistan's case, the enrichment approach -- if it works -- conceivably could provide the basis for a SNF of perhaps two dozen warheads by 1990, and three times that number by 2000, even if the enrichment capacity is not expanded. Success with that technology might lead to expansion. A somewhat more rapid rate of proliferation could be accomplished eventually if KANUPP is used as a production reactor, though this would require violation or abrogation of safeguards. At this stage, however, Pakistan's limited reprocessing capacity probably would permit only a limited exploitation of this option.

3) Israel:

The data on Israel are by no means certain. They assume that the Dimona (IRR-2) reactor's capacity has been expanded to three times its original size.26/ There have also been press reports and speculation that Israel has succeeded in procuring substantial quantities of HEU, or in developing enrichment technology of its own.27/ If so, the projected size of an Israeli SNF today might be closer to 50 or 100 than about 25. Even the conservative figures suggest a potential Israeli nuclear force by the turn of the century upwards of 100.

4) The Arab World and Iran:

Presently installed nuclear facilities are too small and too few to expect SNF capability to be developed by national means anywhere in the Arab world or Iran in the 1980s. Iraq's loss of OSIRAK in 1981 28/ and the 1979 revolution in Iran interrupted trends that just a few years ago might have produced a different assessment.29/ But these trends could be resumed and the 1990s might tell another story. A handful of Arab states have made progress incrementally on the fundamentals of nuclear training and infrastructure. Nevertheless, it is important to stress what is often overlooked that the personnel

related to basic industrial infrastructure -- e.g., plumbers, masons, electricians -- are not necessarily available in the quality and quantities needed to carry out nuclear development. Nuclear development could be accelerated as technical and personnel deficiencies are overcome and nuclear facilities for research, power, and fuel cycle service are installed.

Foreign assistance could change even the assessment of the 1980s. There were growing signs in the late 1970s that Libya and Iraq were using oil supplies as leverage to obtain nuclear assistance from European and even Third World nuclear suppliers, including Brazil and India.30/ Uncertainty remains about the scope of Libyan financial assistance and uranium supply to Pakistan, and about Pakistan's potential for nuclear collaboration with Islamic states. China's first acts as a nuclear supplier in the early 1980s have been less than reassuring by ordinary nonproliferation standards.31/ A danger looms that underemployed or disgruntled nuclear technologists from the West might be seduced as nuclear mercenaries and provide states in the region with "hands-on" experience sufficient to overcome critical gaps in nuclear weapons research.

The Arab states most capable and likely to press nuclear development are Iraq and Libya (and perhaps Egypt, though in its case political conditions would have to change). Each of these states has evidenced signs of interest in nuclear weapons in the past, though Iraq and Libya have been the principal sources of concern in the post-Nasser era. Very recently, Iran has displayed fresh interest in civil nuclear development.32/ Though Libya would seem even after expected Soviet transfers of research facilities to be the least well-equipped of the four to develop the requisite technology, its nuclear ambitions under Qaddafi's leadership have also been the most explicit.33/ The paired interaction -- Libya with Egypt, and Iraq with Iran -- suggests that proliferation here is likely to come in chains. Each of these states conceivably could mount a SNF based on 5 to 10 weapons before the turn of the century. Plans for nuclear power installation in Egypt and Iran theoretically would give each a nuclear force size potential shortly after the turn of the century comparable to that of India today, or of Israel as projected to 1990.

Advanced Nuclear Proliferation

Advanced nuclear proliferation -- the development of advanced fission or thermonuclear warheads -- would increase the military and psychological potency of any SNF. Israel and India almost certainly would be technically capable of developing thermonuclear devices.34/ To do so, however, would require a nuclear explosives testing program35/ and this probably would be a serious political impediment for both.

The time frame for such advances, if the Chinese experience is an indication, could be as short as three years from the inception of a vigorous development program.36/ In the absence of technical

support from a nuclear weapons power or experienced nuclear weapons designers, however, the lead time probably would be somewhat longer. The historical pace of the French program (i.e., a lag time between fission and thermonuclear capability of 8 to 9 years) might be a better guide than China's.37/

This suggests that such advances by Israel or India are unlikely before the 1990s. But if either has already assembled the appropriate materials production base, conducted sufficient research on nuclear physics fundamentals, and probed for foreign design information or experience, breakthroughs in the 1980s cannot be precluded.

On strictly military grounds, India would seem at first glance to be a more plausible candidate for advanced proliferation than Israel. Given the small scale of the Middle East theater of military operations and the character of targets, Israel would have to take into account the dangers of fallout in determining what kind of weapon to employ or how to employ it. India, on the other hand, possibly has a requirement for long-range nuclear deterrence against China. Given the distances involved, and assuming reliance on a counter-value retaliatory doctrine, India would have a case for thermonuclear or high-yield weapons.

But these points overlook other motives for advanced proliferation.38/ Much of the technology for advanced nuclear weapons is relevant to that required for down-sizing weapons to obtain compatibility with unpiloted delivery systems or to configure them for tactical battlefield uses. Moreover, the technology for thermonuclear and neutron (enhanced-radiation) battlefield weapons is intimately related. In the event of doubts about the credibility of counter-city (last resort) deterrence, Israel plausibly would find military reasons for smaller, lower yield, battlefield weapons. Indeed, in Israel's confined defense environment, the logic for employment of such battlefield capabilities might be "strategic" in nature, not "tactical" as understood in NATO theater parlance.

This sort of logic could also be adopted by other states in the region, perhaps not so much for thermonuclear objectives, but rather to get maximum weapon numbers and reliability from probably limited fissile material inventories, greater confidence in delivery methods, and some protection against counterforce preemption. But technical progress in weaponization would also lower some of the barriers in the way of thermonuclear development.

Nuclear testing would be imperative for breakthroughs in advanced proliferation. Hence, such programs are almost certain to be detected, probably in early stages. The indispensability of nuclear testing to advanced proliferation points to the value of raising the political costs to any state of conducting tests. Preventing nuclear testing, however, cannot be counted upon to prevent the emergence of less sophisticated SNFs.

Summary

Israel reputedly and India certainly already possess SNF capabilities. India might require a year or two to weaponize and deploy a portion of its nuclear assets in operational form to satisfy our SNF criteria. Israel's reputed response time is measured in hours. Pakistan may yet require some time to produce the requisite fissile material and to weaponize, but according to present trends could accomplish both before the end of this decade. Israel and India, in the meantime, could make significant strides in advanced proliferation. By the end of the decade, the potential size of an Indian SNF would be impressive, almost certainly over 100 warheads, and possibly several hundred. Israel's potential SNF size would not be less than two dozen, and might be considerably more. Pakistan's SNF size probably would fall within our minimum range of 5-10 weapons, but might exceed it. In the 1990s, any of these numbers could be multiplied several fold.

Longer-term SNF candidates -- especially Iraq, Iran, Libya and Egypt -- could make capability breakthroughs in the early 1990s and satisfy our SNF criteria before the end of that decade. Past the turn of the century, Egypt, Iran and possibly Iraq could expand potential SNF size significantly from dedicated facilities, and much more rapidly if diversion from planned nuclear power plants is adopted.

Some SNF proliferation in this region appears to be inevitable. Barring major surprises, the expectation that Israeli, Indian and Pakistani SNFs will materialize unmistakably before 1990, or soon thereafter, seems irresistable. Greater uncertainty about the other candidates is admissible, but it seems reasonable to expect that one or two other SNFs will materialize in this region by the turn of the century.

Chapter Two

MILITARY CHARACTERISTICS

The immediate impact of any actual proliferation of SNFs in the Middle East or South Asia on U.S. security interests may occur mostly because of the political and psychological responses by the international community to the fact of nuclear proliferation, irrespective of its objective military character. Similarly, the regionally destabilizing effects and strategic significance of SNF appearance will be more profound with the shift from zero to five or ten weapons than from subsequent increases of nuclear weapons in a SNF inventory. But the long term impact of that SNF both on regional military stability*/ and U.S. interests will relate directly to its size and military characteristics, or perhaps more precisely to perceptions of its size and military characteristics.

SNF Capabilities vs. Employment

What a SNF might be capable of and whether and how it is actually to be employed are distinct but intimately related questions. Politics and policy ultimately will determine the expected conditions of use, but technical parameters will set certain boundaries on what is feasible at any given point in time. A serious concern about regional military stability in the wake of proliferation is the potential for miscalculation, especially in crises. Miscalculations can originate in external misperceptions or in internal politics (e.g., impulsive or unstable leadership), but they can also be due to technical flaws and inadequacies in military forces, ignorance about the potential performance of those forces, and illusions about the leverage that might be derived. Miscalculations with conventional military forces can be costly as well, but in the case of nuclear forces they are far less likely to be retrievable.

Given the notional warhead numbers discussed earlier, the main military characteristics of SNFs we are concerned with in this chapter are (1) nuclear delivery systems and performance and (2) C3I, nuclear deployment and employment. Some further discussion of SNF warhead characteristics in conjunction with delivery systems also is necessary. Before this discussion of military characteristics,

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* By "regional military stability" we are referring not to the political involvement of military forces in their societies but rather to the inclinations of national leaders concerning the use of military force. When their inclinations to go to war or run a high risk of provoking war are positive, the situation is militarily unstable. Such instability can arise from shifts in perceived military balances as, for example, by one nation's deployment of a SNF.

however, it is important to note the geographical features of states to understand how prospective decisions concerning the deployment of nuclear forces are likely to evolve.

Geographical Considerations

Geographical features already help to define conventional military asymmetries; the addition of SNFs may accentuate these, or alter them.1/ Geography also will influence perceptions by regional states of their respective risks and vulnerabilities resulting from SNF deployments.

Overall size of territory and population, and dispersal of urban population, may be key factors in mitigating perceived threats to basic survival, or the survivability of nuclear and conventional military forces against nuclear attack, whether by surprise or otherwise. India primarily, but to a lesser extent Pakistan and Iran, may feel themselves appreciably better off on these dimensions than most of the Arab states or Israel. For the latter especially, small state size and urban-concentrated national assets may combine with very short flight distances and nuclear-equipped aircraft to degrade regional military stability, particularly in crises.2/ Nuclear missile forces could put regional military stability under even greater pressure.

From the standpoint of the owner of a SNF, proximity to high value targets, or to the choke points of commerce and major power naval access to the region, might appear to offer certain advantages, but could just as well open up other militarily destabilizing issues. The latter could involve broadening the scope of conflict or inviting great power preemption.3/

Aircraft Delivery Systems

High-performance, nuclear-capable tactical aircraft of U.S., Soviet and West European manufacture are already widely disseminated in the region, are steadily being upgraded, and probably will be replaced with a new generation of even more sophisticated aircraft by the time more than one or two SNFs are locally and openly deployed. Table 2 provides a summary of the nuclear-capable aircraft deployed today by the more likely proliferation candidate countries of the region. An estimate of nuclear-capable aircraft capabilities in the same countries as they might appear in 1990 is provided in Table 3.4/ (These tables are derived from more detailed information reproduced in Appendix C, Delivery Systems.)

1) Simple Air Delivery:

Some experts believe that only very rudimentary capabilities are needed for a SNF and also that the SNFs most likely to appear in this region would be quite primitive. It is usual to point out in this connection that the first deployable fission weapons of a new SNF may weigh over 2,000 kilograms, and be correspondingly bulky. Perhaps the easiest way today to deliver a relatively crude bomb of this sort

Table 2

MODERN NUCLEAR-CAPABLE AIRCRAFT

THE REGION TODAY (1982)*

COUNTRY	Total Operational Combat Aircraft	Total Dedicated to Attack Mission	Nuclear-Capable Long Range/Strike	Range in Km 1,000kg payload**
INDIA	635	227	116	
			10 MIG-23 BN/UM	390-720
			16 Jaguar GR-1	720
			45 SU-7 MkBM	175-320
			45 Canberra B(1)-58	1,100
PAKISTAN	219	62	54	
			34 Mirage 5 PA	600-1,200
			6 F-16 B	1,200
			14 Canberra B-57	1,100
IRAN	217	130	70 F-4 D/F	750
IRAQ	330	115	200	
			75 MIG-23 BM	390-720
			80 SU-20	620
			36 Mirage F-1	750
			9 TU-22	3,100
ISRAEL	634	Not available	244	
			40 F-15 A/B	2,000+
			138 F-4 E	750
			66 F-16 A	900
EGYPT	429	232	99	
			10 F-16 A	900
			35 F-4 E	750
			40 Mirage 5	600-1,200
			14 TU-16	4,800
LIBYA	555	218	198	
			14 Mirage F-1 AD	750
			100 SU-20/22	620
			45 Mirage 5 D/DE	620
			32 MIG-23 BM/U	390-720
			7 TU-22	3,100

* Adapted from estimates supplied by Anthony Cordesman. See Appendix C for more detail.

** Hyphenated numbers indicate separately radius for Lo-Lo-Lo and Hi-Lo-Hi mission flight profiles.

Table 3

NUCLEAR-CAPABLE AIRCRAFT

THE REGION IN 1990*

COUNTRY	Nuclear-Capable Long-Range/Strike	Estimated Number	Range in Km 1,000 Kg. Payload**
INDIA	Mirage 2000	150	460-1,480
	Jaguar (Imp)	100	1,000+
	MIG-23 BN/UM	72	390-720
PAKISTAN	F-16 B/C	150	1,200+
IRAN	?	?	?
IRAQ	MIG-23 I	100	500-1,100
	MIG-27	80+	390-720
	Mirage F-1	72	750
	Mirage 2000 I	100+	460-1,480
ISRAEL	F-15 E/B-Mod	125	2,000+
	F-4 E/P-110	100	900+
	Lavi	50	350-500
	F-16 C/B Mod/XL	200	1,200+
EGYPT	F-16 A/C	150+	900+
	Mirage 2000	50+	460-1,480
LIBYA	MIG-23 I	200	500-1,100
	SU-24	150	800-1,800
	MIG-25 U	60	1,200
	Mirage F-1 AD	**	*

* Adapted from estimates supplied by Anthony Cordesman. See Appendix C for more details.

** Hyphenated numbers indicate separately radius for Lo-Lo-Lo and Hi-Lo-Hi mission flight profiles.

would be by a C-130 or similar transport aircraft, and to push it out on a pallet from the cargo hold over the target. No doubt, this is a possible means of delivery; indeed certain states might initially be confined to such means. Moreover, a SNF with transport aircraft delivery means may be militarily credible as a penetrator against the thinly deployed air defense systems available in most states of the region today.

Yet it is doubtful that such a primitive delivery mode would be tolerated for very long by most states in this region.5/ Even today, most of the proliferation candidates have tactical strike or medium bomber aircraft quite capable of delivering payloads greater than 2000 kg.

2) Sophisticated Air Delivery:

Most states of the region would, in the event they develop SNFs, almost certainly prefer to achieve assured penetration capabilities against expected air defense improvements and will try in general to procure state-of-the-art equipment. Israel's air defense capabilities are already fairly sophisticated. These and the deployment of AWACs in Saudi Arabia indicate the direction air defense capabilities are moving. Highly skilled pilots flying on the deck with ECM aids, however, could penetrate almost any local air defenses which are foreseeable in this region.6/

As a general rule, therefore, most SNF planners in this region will seek to mate nuclear weapons at least to high performance tactical aircraft, pursuing weaponization refinements that permit external carriage, including high-speed, low altitude performance. Compromises in speed and range are most likely to be required at the outset, but these constraints may be tolerable and subject to eventual amelioration by aerodynamic improvements in the weapon cross-section and by use of conformal fuel tanks.7/

3) Air Distance and Response Time:

The illustrative air distances and travel times displayed in Table 4 show that air-delivered nuclear responses could be carried out in very short intervals. In each of three obvious theaters, the subcontinent, the Gulf, and the Middle East proper, the nominal (subsonic) air times between launch points and key cities seldom exceed an hour and more typically range between 20 and 45 minutes. The shorter intervals are similar to ICBM and SLBM travel times in the U.S.-Soviet strategic balance. A nuclear crisis under these compressed time conditions could put extraordinary pressures on local decision-makers and, in the absence of robust C3I arrangements or provisions for ensuring the survivability of the nuclear force, the resulting situation might be highly unstable militarily, not to speak of politically.

Missile Delivery Systems

1) Aircraft-Missile Comparative Advantages:

Table 4

ILLUSTRATIVE AIR DISTANCES AND TRAVEL TIME

Points	Distances (in kilometers ± 5%)	Travel Time in Minutes (at 800 Km/h)*
(The Subcontinent)		
Rawalpindi-Delhi	565	42
Ambala-Lahore	280	21
Jaisalmer-Karachi	445	33
Karachi-Bombay	885	66
(The Gulf)		
Tehran-Baghdad	755	57
Abadan-Basra	80	6
Basra-Dhahran	510	38
Basra-Riyadh	640	48
Bushehr-Dhahran	310	23
Bushehr-Riyadh	645	48
(The Middle East)		
Tel Aviv-Damascus	200	15
Negev-Cairo	320	24
Baghdad-Damascus	725	54
Baghdad-Tel Aviv	885	66
Benghazi-Tel Aviv	1,000	75
Cairo-Tripoli (Libya)	1,720	129
(Inter-Regional)		
Gauhati-Chunking	1,430	107
Peshawar-Tashkent	860	64
Tel Aviv-Karachi	3,300	247
Tel Aviv-Tbilsi	1,330	99
Tripoli (Libya)-Naples	885	66
Benghazi-Athens	800	60
Tabriz-Ankara	1,300	97
Mosul-Donetsk	1,370	103

* This subsonic speed is nominal. Actual speeds could range higher and cut travel times considerably from those displayed.

Ballistic missile nuclear delivery systems have certain advantages over aircraft, but also significant disadvantages. In this regional context, the principal advantages for the SNF planner would be: (1) dispensability (i.e., would not require special facilities like runways); (2) certitude of penetration (assuming successful launch); (3) potentially instantaneous response; and (4) possible dedication of the system to a specific mission, probably retaliation. All of these factors could be expected to enhance deterrence, though this result may be dependent on sufficient force size, dispersal and concealment.

A generic disadvantage of ballistic missiles is that, once fired, they cannot be recalled. They are much more likely than aircraft to face decisionmakers with "use it or lose it" situations -- a serious drawback when they are nuclear-armed. In general, first generation ballistic missiles are much less versatile and reliable than aircraft for missions against mobile targets or hardened facilities at fixed sites. Moreover, though this may be system specific and varies according to distance, first generation ballistic missiles generally are less accurate than aircraft, and more likely to cause unintended collateral damage.

In this region, it appears unlikely that ballistic missiles will be the initial means of deployment or the mainstay of most SNFs.8/ There are several reasons. The most important in the near term is the technical difficulty of engineering nuclear weapons to conform to the payload limits and cross-section of a missile. A second factor is likely to be the conspicuousness of long-range ballistic missile development and the associated presumption of nuclear intent. But a more general influence will continue to be the relative flexibility of aircraft for nuclear and other military missions in the confined theaters characteristic of the region.

2) The Case for Missiles:

Over the long term, nonetheless, ballistic missiles are as likely to appear in some SNFs as the SNFs themselves, usually in a supporting role.9/ The commercial availability of the relevant technology is growing.10/ Some SNF planners may be inclined to diversify their forces for survivability and deterrence stability by deploying short-range missiles. India's interest in obtaining an independent strategic nuclear deterrent vis-a-vis China virtually dictates long-range ballistic missile development.11/ A few SNF candidate countries might even conceive a requirement for ballistic missiles as a means of deterrence against, or political leverage on, one or another superpower.

Another factor that may drive ballistic missile acquisition -- a factor that may already be at work -- is the possible utility of ballistic missiles as the means of delivering chemical and bacteriological weapons. Development of this capability by certain states, as a "poor man's deterrent" against neighboring SNF threats, cannot be discounted. When the opponent's territorial space is very confined, the accuracy requirement for ballistic missiles equipped

for CW/BW purposes need not be higher than that for nuclear attacks on value targets, and such systems later may be converted to nuclear purposes in the event the requisite nuclear development breakthroughs have been accomplished.

3) Missile Transfers:

Nuclear-capable surface-to-surface missiles (SSMs) have been transferred in relatively small numbers to certain countries in this region, as indicated in Table 5. These include the U.S. Lance to Israel, and the Soviet FROG and SCUD systems to four or five Arab states. With the possible exception of Israel, the local states are unlikely to be able to equip these missiles with indigenously-manufactured nuclear warheads. While it does not seem likely, the Soviet Union might at some point in the future transfer or promise transfer of nuclear warheads to equip these weapons -- most probably, in that event, retaining control over employment.12/ The more general danger of these particular systems may be to acclimate the region to the presence of ballistic missiles.

4) Missile Development:

Israel and India have active ballistic missile development programs, the character of which in either case is highly suggestive of nuclear force intent. The Jericho SSM under development by Israel may have a range of over 500 kilometers and would thus be capable of targeting Cairo, Damascus, and Amman. India recently tested an indigenous space launch vehicle that would be capable of carrying a 500 kg. warhead in SSM mode about 500 kilometers, and thus is potentially nuclear-capable and serviceable against much of Pakistan. The space program probably will give India a capability, sometime after 1990, to manufacture and deploy nuclear-capable SSMs with a range of about 3,200 kilometers, sufficient to target virtually all of China (as well as southern regions of the Soviet Union, Iran and the Persian Gulf). India also has a submarine acquisition and development program that implies the potential for retrofit of ballistic missiles as SLBMs.13/

5) Cruise Missiles:

The proliferation of certain aspects of cruise missile technology can also be expected in the region, though the nuclear applications are more uncertain. The use of remotely-piloted vehicles (RPVs) for reconnaissance purposes is already highly developed by Israel, and its Gabriel ship-to-ship and air-to-ship cruise missiles have been demonstrated for conventional military purposes. Similarly, the conventional applications of cruise missiles are likely to be of far greater interest to military planners in this region than their possible nuclear uses, at least within the time frame of this study.14/ India possibly would be an exception. Its long-range military requirements for China could make nuclear-equipped, long range cruise missile development attractive.

Table 5

NUCLEAR-CAPABLE BALLISTIC MISSILES

IN THE REGION*

COUNTRY	Number of Deployed Systems	On Order or Under Development	Estimated Number 1990	Estimated Number 2000	Range in kilometers
ISRAEL	12 Lance SSM		35	-	8-120
	? Jericho SSM		50	25	480-600
		Jericho II	6	35	?
EGYPT	12 Frog 7 SSM		?	-	60
	12 Scud B SSM		24	?	160-280
		Saqr "X" SSM	?	60	600+
LIBYA	48 Frog 7 SSM		48	?	60
	70 Scud B SSM		70	70	160-280
		? SS-22 SSM**	?	?	350
		? SS-23 SSM**	?	?	1,100
IRAQ	19 Frog 7		?	?	60
	9 Scud B		60	100	160-280
		? SS-22 SSM**	?	?	350
		? SS-23 SSM**	?	?	1,100
SYRIA	24 Frog 7		24	-	60
	70 Scud B		70	70	160-280
		? SS-22 SSM**	?	?	350
		? SS-23 SSM**	?	?	1,100
INDIA		indigenous SSM	24	-	480-560
		indigenous SSM	-	150	580-650
		indigenous IRBM	-	30	1,930
		indigenous IRBM	-	12	3,200
PAKISTAN		Chinese SSM	?	?	600+
		indigenous SSM	?	35	480

* Adapted from estimates supplied by Anthony Cordesman and reproduced in more detail in Appendix C.

** These are Soviet missile systems which are currently being deployed with Soviet forces, but which could be available for export at some time in the future.

Other Nuclear Delivery Systems

It is quite possible to visualize unconventional delivery of nuclear devices, by truck across a border or by commercial ship into a foreign harbor, though such methods are more likely to be used for terrorist than for military purposes. The emplacement of nuclear mines to blockade maritime choke points, to create barriers on land, or to neutralize occupation of airfields or ports are less orthodox but conceivable military uses of SNFs in this region that deserve mention.

C^3I Considerations

The solution of nuclear C^3I (command, control, communications, and intelligence) problems in this region, just as with advanced weaponization and sophisticated delivery system development, will be technically difficult and probably, therefore, a long, drawn-out process in most cases.15/ Local nuclear C3I may also, as with nuclear employment policies or doctrines more generally, be influenced or constrained by political and cultural attributes of states in the region in ways quite different from Western experience.16/

This point should not be pushed too far. Modern weapons have functional attributes that tend to confine organizational, deployment and employment alternatives within certain boundaries. There is little in what we can perceive about the Chinese nuclear force, for instance, that suggests unorthodox solutions to nuclear C3I or deployment. China's nuclear no-first use declaratory policy does depart from superpower employment doctrine, possibly because of the absence of a Chinese requirement for "extended deterrence." But this is declaratory policy, not necessarily a prediction of what would happen when the chips were down, and it is not, in any case, a culturally distinct strategic concept; rather it is the familiar, finite nuclear deterrence posture.

In the Middle East and South Asia, the technical aspects of SNF C3I alone are likely to contain dangerous implications for military stability for several reasons: (1) C3I capabilities are almost sure to be highly asymmetrical in scope and quality between rival SNFs (e.g., India vs. Pakistan, or Israel vs. Iraq), especially in the incipient stages of SNF deployment, possibly tempting the disadvantaged side to compensate by a launch-on-warning (hair-trigger) posture; (2) C3I, especially "positive control," may break down in a crisis, because of technical deficiencies in assessment, e.g., accidental detonation or third-party "spoofing;" (3) known C3I discontinuities and vulnerabilities may force normally cautious decisionmakers to make rapid and high risk decisions under stress; and (4) unknown C3I discontinuities could deprive decisionmakers of feedback about or control over their own military movements, which in turn could be perceived by the opponent as a nuclear attack in progress.

Political problems and endemic distrust, compounded with technical deficiencies that exist for other reasons, could obstruct rational development of C3I organization and technology. Unstable political leaders may tend to put a premium on personally centralized and arbitrarily compartmentalized types of organization which could well be accident-prone. Command and control over nuclear weapons may become highly uncertain in the course of coups d'etat or internal strife, particularly where factionalism in the military is pronounced.

Summary

Aircraft, primarily high-performance tactical aircraft, are already abundant and likely to be the delivery system of choice for most SNFs in this region, though transport and light/medium bomber aircraft could be employed at the earliest stages or under duress. Consequently, the lead-time from nuclear explosive capability to deployed airborne SNFs need not be very long and in the future could become almost negligible in most cases.

The transfer of nuclear-capable ballistic missiles to certain states in the region has already occurred, but these are unlikely in most cases to be nuclear-equipped by local national means because of the technical difficulties of weaponization. If they are followed by transfers of larger throw-weight missiles, however, certain states may be able to develop compatible nuclear warheads.

Israel and India are almost certain to be capable of deploying nuclear-capable SSMs of short to medium range, and probably could weaponize them, within the next 5-10 years. India should also be capable, before the end of the century, of deploying IRBMs with a range sufficient to target most if not all of China. Egypt's missile development program may provide another indigenous nuclear-capable SSM capability in the region, though past experience suggests this would materialize later rather than sooner. The growing commercial availability of ballistic missile systems or components may allow other countries indigenous medium range SSM development or production. Pakistan is a likely contender, though probably not until the 1990s or after the turn of the century.

Cruise missile development for SNF purposes cannot be ruled out, but regional trends with this technology are much less defined.

PART TWO—SMALL NUCLEAR FORCE THREAT ASSESSMENT

Chapter Three

REGIONAL NUCLEAR THREATS AND CONFLICT POTENTIAL

Regional states that deploy small nuclear forces will have sharply increased capability to inflict mass destruction, and, crucially important, a novel capability to inflict such destruction suddenly. The real and perceived threats that come into play imply a variety of possible military postures and actions, typically with high political content. SNFs will also pose potential threats to states in neighboring regions, and to the projected forces of the superpowers and those other major external powers which have military commitments in the region.

This chapter outlines in generic terms the classes of threat SNFs would introduce, and identifies consequences that go beyond the region. It focuses on the political and security interaction of the regional states to assess the more likely consequences of SNF introduction in particular intra-regional contexts. Later chapters address the threat perceptions and probable responses of the USSR and Western Europe to SNFs in the Middle East and South Asia, and the specific impact SNFs might have on U.S. military forces and operations.

Generic SNF Threats

Generic threats are an expression of what SNFs are capable of doing, not predictions of how SNFs will be employed. What SNFs are capable of doing, however, surely will become part of the perceptual and psychological context of diplomacy and military contingency planning of states in the region once SNFs are deployed, and even to some extent once their deployment is imminent. Likely perceptions of generic nuclear threats cannot be ignored.

1) Threats to National Survival

SNFs based in this region could not, for the foreseeable future, pose a direct threat to the survival of the superpowers or any major state outside the region. SNFs in this region (e.g., in Israel, Iraq, Iran and India) foreseeably could threaten parts of the USSR with nuclear attack, the results of which would hardly be pleasant, but they would not be capable of inflicting "mortal" damage to so large a state. Even within the region, where SNF range limitations might not be so severe, a very large country such as India would not necessarily face a challenge to its national survival from a neighboring SNF.

For Israel and most Arab states, however, SNF attack could virtually eliminate the urban, industrial and skilled population base of the nation. This possibility is due to the tiny physical size of some of these states, and in other cases to the degree to which the industrial and economically vital population, and cultural identity,

are associated with a major capital city (e.g., Cairo, Damascus, Baghdad), a mere handful of other cities, or with narrow strips of inhabitable territory.1/ Two or three 50 KT nuclear weapons dropped on Israel, and a dozen unleashed on almost any one of its neighbors, could be enough to terminate meaningful national existence. To the prompt effects of such nuclear weapons would have to be added the effects of radioactive fallout, from which few would be altogether immune to these territorial confines.2/

2) Threats to Physical Assets

Threats to some physical assets, those located in cities, are subsumed above in the threats to national survival. The other important civilian physical assets in the region against which nuclear weapons could be used include: (1) hydroelectric and thermal electric power-generating installations; (2) ports (which, however, usually are associated with cities); (3) oil production, storage and marine-loading facilities; and (4) communications facilities.

Nuclear weapons, especially when few in number, are not necessarily cost-effective in comparison with conventional ordnance against certain kinds of bulky targets. Disabling such targets might better be done by strikes limited to critical components. For a terrorist attack, this consideration could be beside the point, of course, but it would matter in professional military planning. The military calculation that would come into play, once the need for the mission is established, would be based on the number of air sorties (or other assets) required to carry out a conventional mission, the density and quality of the air defense (if any), and the expected attrition rate of aircraft (or other assets).

Against a port, where critical components might be hard to identify or attack, nuclear weapons could be attractive because of their greater power, and low number of sorties required. This would have to be weighed against the usefulness and feasibility of mining the port or its access channels, and the local capability to sweep the mines. But while a superpower might have options for air-dropping sophisticated mines, these options might not be available to a SNF state. An SNF state might be incapable of disabling a port except by nuclear attack.

Hydroelectric installations offer certain parallels. If the object is to disable the electric plant, conventional strikes on the turbines or their control system might be quite sufficient. If, on the other hand, the object is suddenly to flood the downstream region to inflict maximum casualties and prompt economic disruption -- conceivable, for instance, in the case of the Aswan dam or several large hydroelectric installations in the subcontinent -- the dam itself would have to be fractured. For a SNF power, the only sure method of carrying out the mission successfully might be nuclear attack.

Oil, which is of much greater international importance, involves analagous military considerations. Critical oil facilities --

pumping stations, storage farms, and marine loading terminals -- can be put out of action by conventional air strikes, or even by commando teams of saboteurs operating on land or from the sea. The geographically unique concentration of very large marine loading terminals and associated pumping and storage systems in the Persian Gulf (Ras Tanura in Saudi Arabia, Kharg Island in Iran, and Al Faw in Iraq) invite special interest. Normally, about 80% of Persian Gulf oil is routed through these three major facilities -- all within a few minutes flying time of each other. Their vulnerability to conventional air attack is well known, but is now demonstrable by the fact that Iran's relatively inefficient air force has been able to keep the Iraqi facility disabled since early in the war.3/

The possibility that one, two, or all of these concentrated oil facilities might someday be considered a target by a SNF power, as a means of bringing oil producers to bay, or in order to extract concessions from the West, or even to deny the oil to an interventing superpower, cannot be totally discounted. The advantage that nuclear weapons would provide in such circumstances are clear. They could, with a relatively few sorties and warheads -- perhaps three or four for each major marine loading installations -- instantly cripple the entire flow of oil for a considerable period of time. Given the fact that several of these facilities occupy several square miles, it might be necessary to use several weapons. Moreover, to deal with reliability of penetration, a SNF might still need to deliver several weapons. To accomplish the same result by conventional ordnance with the tactical aircraft available in the region, however, probably would require a much larger number of sorties and would take much longer, even if there were no resistance. Because almost certainly there would be intense resistance, a regional power probably would be unable to inflict a comparable level of destruction by conventional means. That a Soviet Long Range Aviation force could eliminate the oil facilities by conventional means is undeniable,4/ but that is an entirely separate issue.

Oil facility down-time after a military attack is a further issue because of the international importance of oil.5/ If appropriate spares and replacements have been stocked, many critical oil facilities can be repaired within weeks or a few months, even after a well-executed air strike. Nuclear weapons would be much more indiscriminately destructive, however, and could leave radioactive contamination. Decontamination and reconstruction would still be conceivable after a nuclear attack, but the task would be many times greater and probably would overwhelm the available technical, organizational and physical resources for a considerable period of time.6/

Conventional weapons can be used to impair communications by direct attack on exposed communications links, e.g., telephone switching facilities or microwave antennae. But nuclear weapons are accompanied by special effects, such as electro-magnetic pulse (EMP), which can interrupt or disable electronic communications systems much more extensively. Depending on size of yield and altitude of nuclear burst, EMP can operate to much greater distances than the blast and thermal affects of the detonation.7/

3) Threats to Military Forces

SNF threats specifically to U.S. military forces are considered in more detail in chapter 4, and also are touched on in a more general way under point 5, on escalation, below. SNF threats to local military forces would alter fundamental military calculations about the prospects for victory, bargaining or intimidation with conventional military forces, open the possibility of decisively crippling base-concentrated air and naval forces with relatively few attacking assets, and present risks to the survivability of C3I systems for military offensive or defensive purposes. U.S. interests would be directly engaged if local SNF capabilities presented a real and present danger of overwhelming the defenses of regional friends and allies or states which posses vital physical assets.

4) International Passage and Choke Points

SNF capabilities could be employed to limit peacetime commercial and military transit of maritime choke points, such as the Hormuz Strait or Red Sea, by prepositioning nuclear mines subject to detonation by remote control, without immediately threatening vital physical assets or the territory of any particular state.

5) Catalytic Effects and Nuclear Escalation

The interests and regional military involvement of the superpowers, which may involve superpower nuclear weapons deployments in international waters adjoining the region (or, in the case of the USSR, on its own territory adjoining the region), makes it conceivable that local SNF employment and nuclear conflict could entangle the superpowers in direct military confrontation, with the danger of nuclear escalation to the global level. Antecedents of the potential for catalytic war were already present, according to some accounts, in the Yom Kippur War crisis of 1973.8/ Short of actual nuclear conflict, but partly because of these catalytic potentials, the deployment of SNFs could disturb the East-West strategic or political balance in the region.

6) Nuclear Terrorism and Blackmail

SNF proliferation would open doors to potential nuclear terrorism by governments as well as non-state actors. Nuclear terrorist threats could be focused, for example, on urban areas in or outside the region, or on international travel facilities, to achieve maximum publicity for political leverage on target governments.9/ Nuclear terrorism presents extraordinarily difficult security problems. Because the motivations for its use are unconventional, the targets that could be selected are so numerous, and the clandestine methods of possible deployment so varied, specific defense plans rarely can be arranged before the manifestation of an actual threat.10/

7) Global Proliferation

SNF appearance in the Middle East or South Asia could break down the political and legal barriers to proliferation in other regions, setting in motion new trends of political and military instability on the global level.11/

Regional Nuclear Motivations

Whether any particular adequately-endowed country in the region will develop nuclear weapons capabilities and deploy a SNF is ultimately a function of its goals and motivations. Those goals and motivations will also influence the kind of SNF acquired, the manner in which it is deployed, and the planning for employment. Goals and motivations are subject to change, however, so the problem is a dynamic one.

If one runs through a checklist of why any government might want nuclear weapons, some of the countries of this region would appear more than once on that checklist now, and others could be expected to before long, as illustrated in Figure 2.

Israel has faced a chronic and usually intense threat of extinction from the Arab confrontation states and Palestinian irregular forces. If Israel has developed a SNF, it has done so to alleviate active and prospective military threats to its survival from potentially overwhelming conventional military forces in the hands of its opponents. If Israel has not yet done so, it presumably will do so if the conventional military balance shifts unfavorably or if an opponent acquires a SNF.12/ The Arab confrontation states, on the other hand, have repeatedly applied military force against Israel for intensely-held revisionist objectives. One or another confrontation state may come to the conclusion that a SNF in reserve is crucial to decisive application of conventional forces for revisionist purposes. In any case, perception of an overt Israeli SNF would constitute strong pressure on an Arab confrontation state to acquire a nuclear counter force, for defensive purposes as much as revisionist ones.13/

It seems less likely that Arab states would be motivated to acquire SNFs merely to have a stronger hand in dictating the outcome of intra-Arab rivalries or disputes. Arab cultural and political affinities normally would inhibit nuclear weapons deployment or use by one Arab state against another, But there could be exceptions -- today Libya appears to be a possible candidate -- in which a maverick Arab state employs nuclear threats against another. Once one or more Arab states deploy SNFs for whatever purpose, however, the evolution of political and military conflicts in an unstable environment would be bound to make one state far more wary of another, precisely because of its SNF capabilities.

Where a major political and religious revolution occurs and leads to intense interstate war, as we have seen recently between Iraq and Iran, the passions of reliqious revisionism combined with

Figure 2

Estimate of SNF Motivations/Goals by Country

Countries

P=currently probable; F=probable in future;
N=not ascertained or unlikely; ?=uncertain
or remotely possible

SNF Motivations/Goals	Israel	Libya	Egypt	Syria	Iraq	Iran	Saudi Arabia	Small Gulf States	Pakistan	India
o perceived need for a nuclear weapons counter to an existing or presumed nuclear force in the hands of an opponent, either to guarantee survival or to neutralize potential intimidation;	F	P	F	F	P	F	?	?	P	P
o perceived need for nuclear weapons to offset threats to national survival from overwhelming hostile conventional forces;	P	?	N	F	F	F	?	N	P	?
o the desire to enhance by nuclear means the "compellance" inherent in available military forces where there is a manifest propensity to use military force for passionately held, revisionist political objectives;	?	P	?	F	P	?	N	N	?	?
o desire for international recognition, status, or prestige presumed to be associated with nuclear weapons possession;	?	P	?	?	P	F	F	?	P	P
o need to manage domestic compulsions, especially regime or elite survival in the face of challenge, or to head off tendencies toward civil war, for which nuclear possession might be symbolically important.	N	P	?	F	F	F	?	?	P	?

territorial stakes, domestic political instability, and inconclusiveness of conventional military conflict almost certainly would enhance interest in the potential political and military utility of a SNF.

In South Asia, the primary motivations for nuclear proliferation by India and Pakistan seem reasonably clear. India seeks a counter to potential nuclear blackmail by China. Remote though this contingency may seem to distant observers, it has not been so easily discounted in the past by India because of Sino-Pakistani diplomatic and military cooperation on issues of central importance to the subcontinent. Today, the near term possibility that Pakistan will acquire a nuclear option is an added motivation for India, and a more urgent one politically. Pakistan's SNF motivation, in turn, is based on the perceived need for a guarantee of immunity from aggressive use of India's superior military forces which, in Pakistan's perspective, already presupposes India's possession of a SNF stockpile. Pakistan's capacity to defend itself against India is also a domestic political issue, and is linked with the capacity to preserve national integrity against potential regional separatist movements.14/

Several states in the area appear to be driven by international status considerations that could make the political utility of SNFs seem attractive, but their SNFs, by the same logic, would have to be regarded as corrosive to U.S. or Western interests.

The Issue of Rationality

A key question in assessing the probability of outbreak of nuclear war after the introduction of SNFs in this region is the extent to which the nations of this region will operate according to "rational" norms as they are understood in the West with respect to the use or threatened use of nuclear weapons. Experts differ widely on this issue.

At one extreme, some believe the question can be reduced to whether local state leaders have the capacity to assess costs and benefits with care and accuracy, and that most evidence indicates that even the seemingly most radical and authoritarian leaders, including those who are steeped in Islamic traditions or revolutionary experience, show deliberation and restraint when faced with sufficiently high cost consequences of the use of military force.15/

Others argue that there is unmistakable evidence from past experience to assume the possibility that individual leaders or elites may either make choices that seem "irrational" in a Western perspective but which are quite comprehensible in terms of the local political culture, or could be carried away by the emotions of the moment to make what we would regard as supremely irrational choices about nuclear war.16/

This report cannot resolve the issue. It operates on the premise that by and large most leaders have a set of priorities and

goals which give primary importance to national survival and therefore are consistent with what we would consider to be rational. Nevertheless, it should be noted that in this region in particular, governments could come to power with priorities and goals so different from our own that we would have trouble second-guessing their behavior.

Effects of SNFs on Military Balances

Initially, two questions arise about the effects of SNFs on military balances, one being how military weight shifts as a result of SNF deployment in an existing balance structure, and the second being the effects on the stability of the balance. But these questions presuppose that the inter-state alignment underlying the balance persists in some form. Yet that may not be the case. If the effect of SNF introduction causes a rethinking of alignments, this may alter the very structure of the balances assumed, and the transition could be highly unstable for military calculations. This "alignment shift" issue becomes particularly complex when one considers the interweaving of local military balances with the strategic balance between the superpowers.

1) Symmetry and Asymmetry

A high probability effect of SNF introduction on one side of a military balance is to appreciably reduce the assumed offensive utility of conventional forces of the non-nuclear side for revisionist aims (though not necessarily for defense purposes in a war of national survival). This proposition could be qualified if the usability of the SNF had no credibility, which might be the case if its potential use were neutralized by a superpower guarantee to the non-nuclear side, or if it were "tied down" by a superior nuclear threat from a SNF in a partially intersecting, neighboring military balance. In general, however, the depreciation of conventional force utility by SNF introduction would produce the following results: (1) in an asymmetrical conventional balance (itself unstable, particularly if either side has revisionist aims or intense grievances), the SNF would act as an "equalizer" if deployed only by the stronger side; and (2) in an initially symmetrical conventional balance, SNF introduction by one side would suddenly give it significant superiority.

Simultaneous SNF introduction on both sides of a conventional military balance: (1) would not necessarily alter the relative military weights in a structure of prior conventional force symmetry, (2) but in a situation of prior conventional asymmetry would strengthen the hand of the weaker side, though presumably only for defensive purposes.17/

2) Timing of SNF Appearance

Simultaneous SNF introduction is improbable in most local balance contexts. As a practical matter, SNF introduction is likely over time to be sporadic and uneven, lead to force asymmetries, and

stimulate efforts to restore perceived parity. Two aspects of military force instability are attributable to uneven SNF introduction. One consists of the compensating, possible desperate efforts in some cases, that states threatened by SNFs will undertake to acquire an SNF of their own or to neutralize the threatening SNF in some other way. The other consists of the unpredictable decisionmaking that may ensue concerning the use of force when faced with the asymmetries that will exist in SNF weaponization and in the structure of deployed SNF forces, since the development lead times tend to be quite long to establish or upgrade these capabilities.

3) Bipolar and Multipolar Balances

An additional point to bear in mind is that the two sides of a military balance may or may not be two states. Even the seemingly clear two-way Indo-Pakistan balance is complicated by outside forces, while the Arab-Israeli military balance is clearly multipolar. Simultaneity of SNF introduction is virtually inconceivable in the Arab-Israeli balance, making the dynamics of SNF introduction more complicated and unstable.

4) Incentives and Disincentives for SNFs from Balance Considerations

The reduction in the utility of conventional forces caused by SNF introduction is most likely to be appealing, as a general rule, to the weaker side in an asymmetrical conventional force balance, but particularly to intensely threatened states. It is much less likely to appeal to the conventionally superior states, at least not in the context of the balance in which they already have the upper hand.

5) Israeli Considerations

Israel, by this logic, would have relatively little incentive to deploy nuclear weapons as long as it had confidence that it could prevail in any conventional military conflict with its Arab opponents, irrespective of how long the war lasted.18/ But its superiority is highly conditional, unmistakable only in short wars, much less certain in long wars, and certainly dependent in long wars on extensive external resupply. Thus Israel has contingent incentives for a SNF as a last resort against being overwhelmed by the quantitatively superior, aggregated Arab forces. An Israeli SNF would act as an "equalizer" against this long term, putative Arab conventional superiority.19/

6) Arab State Considerations vs. Israel

Insofar as the Arab states have revisionist goals vis-a-vis Israel, presumably they have strong incentives to rely on the future hope for conventional force superiority for primary leverage. SNF introduction by Israel would depreciate that conventional force leverage. In this context (though not necessarily in other contexts), most Arab states probably would not be inclined to proliferate openly first because they would not want Israel to go nuclear and thus diminish their advantage.20/

If the Arab perceptions of the reputed but undeclared Israeli SNF grow stronger, or if Israel declares a nuclear posture, several Arab states probably will have strong incentives to seek SNFs of their own.21/ The nuclear perceptual effect probably is true in Libya already, however, and would become likely in Iraq, and possibly in Syria, Egypt, Jordan and even Saudi Arabia. Arab SNF incentives may also become much stronger if the broader international community comes to believe Israeli territorial goals are not status quo but expansionist -- a perception current in much of the Arab world from the start -- and if the Arab states not only lose hope in ever achieving or effectively exploiting potential conventional superiority for revisionist purposes but become deeply concerned about the adequacy of their conventional forces to resist Israeli incursions or piecemeal territorial encroachments.

7) Intra-Arab World Considerations

Strenuous Arab efforts to acquire nuclear capability, or to compensate for its absence in the interim, could have significant effects on intra-Arab balances and on the superpower military and political balance in the region. The broader community of Arab interests and cooperation might count more strongly in SNF development and possibly lead to shared territorial deployment (e.g., Iraqi SNF detachments in Kuwait or Lebanon, or Egyptian contingents in Saudi Arabia). Just as the conventional rivalry with Israel has led many Arab states to rely heavily on Soviet arms transfer, a perceived nuclear threat may lead to reinforcement of existing dependence and new dependencies on the Soviet Union by states in the region.22/

8) Middle East Balance Linkages

Arab perceptions of and responses to nuclear threats unrelated to Israel may nonetheless matter to the Arab-Israeli military balance, while also affecting other balances in the region. Libya's conventional inferiority vis-a-vis Egypt (manpower and skilled personnel rather than equipment in this case) could be redressed somewhat by a SNF, but, at least as long as Libya is governed by Qaddafi or a leader of similar stripe, this would serve as a powerful stimulus to Egyptian SNF development, with inevitable ramifications in Israeli-Egyptian relations and the Arab-Israeli balance.23/ Similarly, the conflict between Iraq and Iran could stimulate nuclear rivalry in their relationship, with repercussions on the intersecting Arab-Israeli and Indo-Pakistan balances.

9) South Asian Considerations

The subcontinent is one case where SNFs might appear nearly simultaneously, though the characteristics, especially force size, may be quite asymmetrical in India's favor. In this case, prior conventional force asymmetry also is heavily in India's favor. Simultaneous SNF introduction in such a context, as suggested

earlier, would strengthen the hand of Pakistan, the weaker side, but presumably only for defensive purposes. Even if they appear simultaneously in this case, however, they will be very different in terms of versatility, flexibility, and capability, all in favor of India.24/

10) Global-Local Balance Linkages in South Asia

An Indian SNF probably would be developed with China rather than Pakistan as its primary reference point for force sizing, range and diversification. This is implicit in India's space program development of strategic missile delivery capabilities, which might be ready for long range deployment in the 1990s. In the meantime, aircraft delivery systems would be sufficient for India's purposes in relation to Pakistan. An Indian SNF with strategic capability that impacts on Chinese calculations, however, would also have capability against Soviet targets, and in either case could become a destabilizing factor in the Sino-Soviet balance and possibly even the central strategic balance.

11) Superpower Balance

A general effect to be expected from SNF proliferation in the Middle East abd South Asia on the superpower balance in the region is psychological stress on decision-making where the use or threat of force may be called for, and thus deterioration in perceived security commitments. The superpower decision-makers will feel certain pressures to "decouple" from regional nuclear (i.e., potentially uncontrollable) conflict situations, though they may feel these pressures unequally. Allies and friends in the region, likewise, may perceive a weakening of commitments to their security. Vital U.S. interests presumably would preclude total decoupling, but the projection of power into the region may become more difficult in an SNF environment. Political pressures or compulsions could also operate in the opposite way, i.e., by dictating that the U.S. get involved in dangerous situations. On balance, U.S. interests in the region and related decisionmaking probably are more vulnerable to these effects than Soviet interests because the United States is an open society. U.S. public opinion might be sensitive to SNF phenomena and place pressure on decisionmaking. Soviet decisionmaking would be less likely to encounter such pressure.

Nuclear Instability Factors

SNF proliferation will increase the risk of nuclear war in the region.25/ The outbreak of nuclear war could originate in the shifts or political and military balances induced by the introduction of nuclear weapons. Nuclear engagements could also originate from various other destabilizing factors, some anticipated in earlier discussion. These factors are outlined briefly here under the categories of (1) interstate conflict; (2) technical and military; and (3) domestic politics:

1) Escalation of Interstate Conflict

A nuclear war in the region could arise from the escalation of prior conventional conflict, indeed, this may be the most probable general scenario. This region has been replete with military conflict rooted in traditional rivalries, decolonization, and territorial disputes, quite apart from the unique Arab-Israeli conflict. The latter conflict has produced four major wars and numerous smaller engagements: India and Pakistan have been at war thrice, Iran and Iraq are embroiled in a serious war today, and a number of other interstate and guerilla wars have occurred or are still going on in Afghanistan, the Arabian peninsula, north Africa, and the Horn of Africa. Traditional or religious values have given many of these conflicts high emotional intensity and persistence. Once SNFs materialize in the hands of one or more adversaries, it seems inescapable that consideration of their employment will arise in some conflicts of this sort.

Nuclear weapons capabilities in the process of development are likely themselves to provoke preventive military actions, and thus constitute a new source of conflict in the region. The Israeli strike in June 1981 against Iraq's OSIRAK reactor has set a precedent that may be repeated by Israel or emulated by other states. But preventive strikes may produce military retaliation and the outbreak of conventional war. They may even -- where the action is imprecise, incomplete or unsuccessful -- provoke nuclear retaliation. At a latter stage of SNF proliferation, given intersecting military balances, nuclear retaliation might be inflicted by a SNF ally or even a major nuclear power guarantor.26/

As the last points imply, the nuclear escalatory potential of conventional conflicts may be much greater when SNF capabilities are distributed not just in two-way but in triangular or multipolar conflict relationships.

2) Technical and Military Factors

In a political environment where revisionist goals and the expectation of the use of force to pursue those goals are widespread, technical and military factors may contain the seeds of nuclear war.

SNF development, as suggested before, will be uneven, and stretched out. Under these conditions, various asymmetries in national physical asset and population vulnerability, and in military force capabilities, nuclear and conventional, will come into play in the political and military relations between states. The asymmetries, real and perceived, probably will change over time. Compensating actions may be ill-suited to military stability. Misperceptions or miscalculations of adversary capability and intent in a crisis, on either or both sides, could trigger nuclear use of conventional actions escalating to nuclear attack.

Intimately related to the asymmetry problems are likely deficiencies in C3I (especially in the "control" aspects of C3I) and military planning, both of which are likely to lag behind initial deployment of SNFs. Avoiding inadvertent provocation or nuclear

initiation depends on accurate assessments of threats and understanding of the problems of nuclear engagement. Doctrines and contingency planning for nuclear use in some SNF countries, however, are likely to be primitive, inflexible, and quite possibly predisposed to first or early nuclear use in a crisis, even if the doctrinal assumptions are conservative and planned exclusively for deterrence objectives.27/

3) Domestic Political Factors

The high levels of internal political instability, and the emotional intensity and permeation of religious values in the politics of most countries in this region, add greatly to the concern that SNF proliferation would also lead to nuclear war in this region. Inherent in the domestic politics of this region are the social and cultural factors that give unusual intensity to the revisionist objectives of various states, and the fears of others, raising the possibility that SNF capabilities or threats would be used by some states for aggressive, revolutionary or politically destabilizing purposes. More generally, cultural differences may make some states less inhibited about using nuclear weapons than others.

The invariably factionalized, and usually authoritarian or military-based, politics of most states in the region makes it doubtful that robust nuclear C3I arrangements can be set up without internal elements of profound distrust. Regime instability thus could defeat positive nuclear control even where national military objectives are relatively conservative. Factionalism and internal strife also open up the possibilities that nuclear weapons possession or use may play a role in deciding the outcomes of coups d'etat or civil warfare.

Small Nuclear Force Employment Issues

The risks of nuclear war from SNF proliferation in this region will depend in part on SNF employment policies. These will be shaped initially by the motivations for acquiring SNFs in the first place, and by the threat assessments underlying those motivations. But the constraints of the SNF acquired and changes in threat assessments after SNF acquisition may produce evolution in employment policies. It also seems highly probable that top level decisionmakers will be inclined to consider improvisation in employment policy as they face the dynamics of a serious crisis, particularly where various contingencies may not have been anticipated or fully appreciated in advance. SNFs may be especially conducive to improvisation because they are likely to lack institutionalization of missions and roles.

Candidate states may differ in their primary rationales for acquiring and deploying SNFs. Some may do so primarily for political reasons, i.e., for enhanced status or diplomatic leverage, Libya being possibly the clearest case. This rationale also might weigh heavily in other Arab states, particularly the weaker ones, and also in Iran. SNFs acquired primarily for political purposes are likely to be minimal in size and probably fairly simple in terms of delivery system.

Other states may be far more concerned about the military utility, whether military deterrence or warfighting options. These states would not be disinterested in the political impact of SNFs, but would be more likely to subsume them in security planning. Egypt and Pakistan probably would concentrate on finite nuclear deterrence goals. Israel, Iraq and India might begin at the same level, but each probably would attempt to evolve warfighting options in employment planning. Iraq probably could not evolve as fast as the other two because of a more limited technical base. Those states which are interested in the military utility of their SNFs generally also will deploy somewhat larger and eventually more sophisticated forces.

The driving factor for a more sophisticated military rationale in the last three cases would be the complexity of the threat assessment, particularly the number of hostile opponents each faces, and the degree to which those opponents are or could be nuclear-armed. An additional factor may be the calculation of SNF utility as a bargaining lever or deterrent vis-a-vis superpower military involvement in the region. India and Iraq each face potential military conflict on at least two fronts. India already has one nuclear adversary and may soon face another, and Iraq presupposes that Israel has a SNF. Israel is virtually surrounded by active opponents (Egypt since 1977 being the one hard-won exception, though the PLO expulsion from Lebanon in 1982 may result in other improvements in the situation), and is too small in area and population to fight defensively on its own territory or sustain a protracted, intense war in any case.

Official nuclear employment doctrines, if they exist in the region, are concealed since no state yet overtly admits possession of a SNF or even of plans to acquire one. Discussion of likely employment considerations therefore must be based on inference from circumstances, past state behavior, and what can be deduced from dual-capable conventional military assets and doctrine. Mostly in Israel, but to a limited extent in India and Egypt, certain unofficial insights can be drawn from public debates and writings.

1) Israeli Employment

Most of the writing about Israel presupposes that the reputed "bomb in the basement" capability, which possibly materialized between 1967 and 1970, has been developed for either or both of two purposes: (1) a weapon of "last resort" held in reserve against an overhelming conventional military onslaught by Arab opponents, or (2) as a "weapons option" which could be declared or demonstrated to neutralize the potential effects of an Arab opponent introducing nuclear weapons at some future date. Though unstated, the second purpose could have a corollary: unofficial hints that the "weapons option" is instantly available defeats whatever incentive an Arab state might have for accelerating SNF development on the assumption that it could gain unique leverage over a non-nuclear armed Israel

for long enough to extract political or territorial concessions. Possibly it also defeats Arab incentives for attempting preventive military action against Israeli nuclear facilities at Dimona. It has been suggested that Egyptian President Nasser's military planning before and even after the 1967 war may have accorded military action against Dimona a high priority.28/

There is a significant debate in Israel over the political and military utility of nuclear weapons, a debate, moreover, that scrambles rather than divides individuals along classically hawkish or dovish lines.29/

Israeli nuclear proponents, including David Ben Gurion, Shimon Peres and Moshe Dayan, emphasized the "last resort" or "independent deterrent" utility of nuclear weapons against the quantitatively superior Arab military potential. This rationale would seem to imply a counter-value (or counter-city) strategic doctrine, i.e., the threat to destroy the enemy, not merely his military forces. The objective was deterrence of all-out conventional attack or sustained conventional war, with which Israel could not cope. Dayan and Peres believed that a publicly declared nuclear posture would maximize the deterrent effect.

Dayan's pro-nuclear advocacy also had other objectives, namely, to keep the costs of conventional armament (still necessary for self-defense against limited conventional war) within manageable proportions, to preserve maximum foreign policy flexibility and freedom of maneuver between the superpowers (direct U.S. military sypport was assured only for the defense of Israel's pre-1967 borders, not necessarily for Israel's view of what would make "defensible borders"), and add at least uncertainty to, if not thwart, direct Soviet intervention in a conflict. Employment policies designed to deter direct Soviet intervention would either have to threaten to strike at Soviet territory (presumably a counter-value doctrine) or threaten to strike at Soviet forces in the field (a tactical counter-force doctrine). Except in extremis, an Israeli nuclear strike on Soviet territory would not be so plausible as an Israeli nuclear attack on Soviet forces in the region. But the logical implication of the latter policy -- unless it is to be applied indiscriminately -- is a set of requirements for tactical, battlefield nuclear weapons and related doctrines.

SNF attack on superpower forces would greatly increase the dangers of nuclear escalation to the global level. The October 1973 war may have brought the world to the edge of these dangers. There is some evidence that Dayan put the Israeli nuclear force on alert when fear of a Syrian breakthrough on the Golan Heights seemed imminent, and also some evidence that a Soviet ship may have carried nuclear warheads through the Mediterranean into an Egyptian port on the 25th of October.30/ The U.S. also went to a higher level of strategic alert at about the same time, evidently to dissuade direct Soviet intervention in the conflict.

Israeli opponents of a SNF tend to be more optimistic than the

proponents about the capacity of Israel's conventional forces to defend against as well as deter a conventional war launched by any combination of Arab opponents, and thus view a SNF as superfluous. They also attach greater importance to the nuclear proliferation dangers, Israel's vulnerability to nuclear counterattack, and the unreliability of Arab leaders.

Among the opponents, General Ariel Sharon, the former defense minister, rejects nuclear weapons on practical military as well as decision-making grounds. In his view, fortified by references to Korea, nuclear weapons do not deter terrorist activities, wars of attrition or the danger of conventional wars. Rather, nuclear weapons actually tend to prevent decisive military results by making decision-making processes slow and laborious, and because leaders shy away from points of no return. All of this subverts the advantages of Israel's current defense strategy, which depends on the capacity to prevail decisively in short conventional wars.31/ These are rather penetrating arguments. But they leave unstated Sharon's view of nuclear employment issues should Israel nonetheless declare a nuclear posture or find itself facing nuclear-armed opponents.

Because of Israel's small size and vulnerability even to the collateral effects of nearly 20 to 50 KT nuclear detonations, it probably will eschew a public nuclear weapons posture until or unless an Arab opponent acquires nuclear arms. In that event, Israel may declare a nuclear deterrent posture against nuclear attack. Its dilemma then would be how to deal with (possibly mistaken) perceptions that Israel was also self-deterred against a nuclear response to anything but a nuclear attack. One resolution of this issue could take the form of developing tactical nuclear battlefield capabilities, presumably for employment beyond its own territorial confines, but to give options for more flexible employment.

Whatever the declared posture, Israeli decision-makers may resort to improvisation in a crisis. If Israel found itself on the verge of defeat in a massive conventional war and driven to consider nuclear weapons use, it seems more likely that the first use would not be against the opponents' cities and population but rather to supplement conventional forces in a deep-interdiction mode, to destroy or disrupt the opponent's reinforcing forces in their staging areas. In Israel's environment, moreover, this battlefield nuclear employment actually would be "strategic," not "tactical" in the sense that the term is used in the West. Israel might suffer some collateral damage from its own attack, but at tolerable levels when measured against national survival. If, in such a scenario, one or more of Israel's opponents also were nuclear-armed, the likelihood of nuclear retaliation might be very high and even city-avoiding, counter-force attacks on Israel probably would inflict high casualties and economic damage.

2) Arab Employment

Insofar as Arab nuclear employment policies focus on Israel, they are likely to be relatively simple. Israel's extraordinary

vulnerability would make Arab nuclear counter-force and counter-value postures practically indistinquishable anyway, except perhaps in a naval combat environment. Though not equally vulnerable, most Arab states are vulnerable enough and would surely come to appreciate that fact. Their requirements against Israel, therefore, are likely to be defined largely in finite deterrent terms.

A key supporting requirement will be to find adequate means of SNF concealment, dispersal and hardening against Israeli conventional preemptive attack -- since limited strikes that pose no threat to national survival may not be deterred by SNF capability.

Arab states which find themselves in dread of rival Arab SNFs, or of nuclear-armed non-Arab neighbors such as Iran, may feel the need for some force redundancy and perhaps even some nuclear battlefield capability, but even in these cases deterrence is likely to be the main condition for employment.

The more difficult issue in the Middle East context is whether nuclear-armed "rogue" states under compulsive or highly idiosyncratic leaders may arise to threaten or initiate nuclear employment in an unpredictable fashion, perhaps oblivious to deterrence or military stability imperatives, immune to a large loss of life for what they regard as higher ends, or simply determined to trigger conflict betweeen two or more other states. Such instances may prove to be the exception rather than the rule, but it need not take more than one or two instances of nuclear-armed states running amok to precipitate nuclear exchange in a wider circle of states. It is very difficult to be convinced that the nuclear employment policies of revolutionary Iran, if it had a SNF, would have been self-restraining, particularly after the onset of war with Iraq.

A significant dilemma that Arab SNF planners will face, akin to Israel's problem with collateral damage, is the co-location in Israel of Arab and Jewish populations, particularly in Tel Aviv-Jaffa and in Jerusalem. Arab nuclear attack on the holy city of Jerusalem, moreover, is virtually inconceivable.

3) Employment in the Subcontinent

Pakistan's nuclear weapons employment policies are likely to be devoted to nuclear deterrence of major military threats from India. For this purpose, its air force strike range into Indian territory should more than suffice. But Pakistan will face several dilemmas. Its nuclear deterrent will not necessarily be credible against limited Indian conventional military attacks, or military moves in Kashmir. Moreover, just as the Arab states would face the problem of co-located Jewish and Arab populations in Israel, Pakistan would be unable to target significant Indian urban centers without putting very large Muslim minorities (usually 10-20 per cent of the total population of any city) in direct jeopardy. (India, incidentally, would not face the same problem in reverse since Hindu minorities in contemporary Pakistan, with a few urban exceptions, are negligible.)

Apart from the naval theater, Pakistan would have few incentives to develop battlefield nuclear weapons to contest a major conventional invasion. The population density and narrow frontier in the main invasion corridors of Punjab would put its own population at risk from tactical nuclear warfare.32/

India's employment considerations against Pakistan would have many similarities, and probably would emphasize the deterrent. But with much larger conventional forces, India would rely on its nuclear force for deterrence only of Pakistan's nuclear threat, not its conventional threat. Moreover, with greater depth for defense, India may be tempted eventually to deploy for potential preemption or damage-limitation in its SNF counterforce systems. As long as any Pakistani SNF is itself air-based, Indian counterforce systems need not be missiles or even nuclear-equipped but rather, with short flight times needed to penetrate Pakistan's territory, could be high-performance aircraft systems using modern HE PGMs.

India's more formidable requirements will be for strategic and possibly tactical capabilities against nuclear and conventional threats from China. To achieve a deterrent against China, India will have to deploy long-range bombers, IRBMs, SLBMs or a long-range cruise missile system capable of reaching Chinese urban targets. But Indian planners could visualize a requirement for tactical nuclear weapons for employment against conventional forces in Himalayan border choke points, especially in those quite extensive areas where population is sparse.

Judging by these employment considerations, the Indo-Pakistan nuclear balance will not necessarily evolve into a stable one. India's probable nuclear as well as conventional superiority, and potential capacity for preemptive attack, will face Pakistan's planners with troublesome uncertainties. (The need to minimize these uncertainties and the dictates of limited resources probably would force Pakistani planners to confine their expectations to a SNF that might resemble under local conditions the French model of the force de frappe, i.e., the capacity to "tear off an arm.") Pakistan's recurrent political instability may erode internal security and disturb prudent military calculations. India's future political stability itself is not certain. Finally, India may have considerable difficulty reconciling the separate deployment and employment requirements for Pakistan and China with the conditions needed to maintain regional stability.33/

Chapter Four

IMPACT OF SMALL NUCLEAR FORCES ON U.S. MILITARY FORCES AND OPERATIONS IN THE REGION

U.S. military planning for theater nuclear operations traditionally has focused on the Soviet and Chinese nuclear threats. The presumption has been strong that theater nuclear engagement on the periphery of either power eventually would escalate to strategic nuclear exchange between the homelands. This linkage between theater and general nuclear war has made U.S. military planners skeptical of the isolatability of theater nuclear engagements, and therefore of large investments in "nuclear defense," even in a maritime setting. Apparently because of tight budgetary constraints, the encumbrances that nuclear defenses would impose on non-nuclear operations, and the recurring foreign policy needs for conventional force projection, some believe that the U.S. military services have resisted giving nuclear defense high priority, though they believe the Air Force is more "nuclear conscious" and to some degree, therefore, an exception.1/

Within the next 30 years, however, there is a strong possibility that SNFs will emerge in the Middle East and South Asia, a region where some U.S. naval forces are likely to be on station and where other U.S. military forces could be deployed for action. SNF candidate states in some cases are likely to be the cause of U.S. use of force (e.g., Libya, Iraq and Iran), and in certain other cases may be strongly opposed to U.S. military operations in the region (e.g., India). In contrast to traditional U.S. planning assumptions about nuclear threats, the SNF threat will be relatively small in size and in most cases would present little or no direct threat to CONUS. U.S. military engagements with SNFs in this region could involve selected force elements or naval task forces. Nuclear defense planning for the limited U.S. contingents that might confront a SNF would be more feasible than nuclear defenses for a U.S.-Soviet general conflict scenario.

Hierarchy of SNF Threats and Implications for U.S. Regional Operations

A SNF-equipped country could threaten to impede or disrupt U.S. regional projection of military power in the following ways:2/

- o host country intimidation: a country that provides base or transit facilities for U.S. military forces and operations could be coerced to withdraw its support by explicit or implicit threats that it has become a SNF target;
- o host facility preemption: a SNF could be used to destroy prospective host facilities prior to the

arrival of U.S. forces, disrupting the logistical infrastructure needed for regional operations;

- o preemptive attack on regionally-based U.S. forces: a SNF could attack U.S. forces and equipment concentrated in bases and staging areas in the theater to preempt combat capability;

- o nuclear combat: a SNF could be employed against U.S. forces in the theater to preempt combat capability;

- o value target denial: a SNF could deny U.S. objectives for a military operation by destroying value targets -- oil facilities, or an ally's key cities -- that the U.S. intended to secure;

- o constriction of anticipated response: SNF possession, even without explicit threats, may influence U.S. decision-maker perceptions in such a way as to preclude certain types of military operations.

This hierarchy of SNF threats contains implications for U.S. regional military operations in four issue areas: (1) the politico-military effects on host countries pertinent to U.S. military access to the region; (2) the direct physical threats to host facilities and co-located U.S. forces; (3) effects on potential regional battlefields and battlefield operations; and (4) effects on U.S. decision-making prior to military deployment or employment. It also contains implications for U.S. crisis-management decision-making and military operations where Soviet forces may be confronted in conjunction with SNF threats or attacks.

As an aid to the analysis of SNF threats to U.S. regional military operations, a summary of the results of a recent study of U.S. uses of force indicating the frequency with which packages of U.S. military force were used in this region after World War II and prior to the Iranian Revolution is presented in Table 6. The majority of episodes of U.S. use of force involved STANDARD or MAJOR packages. But just as the recent turbulence in Southwest Asia led to U.S. deployment of between two and three carrier battle groups in the Indian Ocean, the U.S. use of MAJOR packages in the future may be more common than the earlier pattern.

Politico-Military Effects on Host Countries

1) Nuclear Intimidation of Host Countries

The 1973 Middle East War demonstrated U.S. logistical difficulties with resupply to Israel when allies denied overflight and launching rights.3/ The appearance of SNFs in this region may well strengthen the tendencies of regional states to dissociate themselves from U.S. military activities.

A threat by a SNF-equipped Libyan, Iranian or other

Table 6

HISTORICAL USE OF U.S. FORCE PACKAGES IN THE REGION*
(1945-1976)

	Two or more force packages	One or more force packages			
REGION	MAJOR	MAJOR	STANDARD	MINOR	TOTAL
Middle East	4	7	7	16	34
South Asia (and sub-Saharan Africa)	0	0	6	7	13
					47

The force package criteria are as follows:

MAJOR: two or more aircraft carrier task groups; or, two or more ground force battalions; or, one or more combat wings of land-based aircraft;

STANDARD: one aircraft carrier task group; or, one ground force battalion or less (but more than one company); or, one or more combat squadrons of land-based aircraft (but less than one wing);

MINOR: no aircraft carriers in naval task groups; or, one ground force company, or less; or, less than one combat squadron of land-based aircraft.

* Adapted by Stephen M. Meyer of MIT for CSIS, from data presented in Barry Blechman and Stephen Kaplan, Force Without War (Washington, D.C.: Brookings Institution, 1978), pp. 49-53.

revolutionary government to target a state which allows U.S. military staging or transit would be impossible to ignore. It would not be cancelled by U.S. security guarantees so easily as a non-nuclear threat.4/ The image of the devastation produced by a nuclear explosion, the brevity of the interval in which such an attack could be mounted, and the inability of even a sophisticated air defense system to guarantee a zero leakage rate of SNF weapons could thoroughly neutralize an otherwise cooperative government.

It is true, as the 1973 case makes clear, that oil embargo threats have already made this problem of denial of military access serious. However, the concerted effort of all Arab oil suppliers may not be a pattern easily repeated, and would not apply to conflict scenarios in which the Arab community is neutral or, as over the Iraq-Iran war, divided. Moreover, some regional states which would be immune to an oil embargo (e.g., Oman) or other producer pressures (e.g., Kenya) would not be insensitive to SNF threats. SNF threats would make things worse, therefore, by reinforcing an existing problem in some cases, and by adding new countries to the list of likely problem cases in others.

2) Logistics and Operations Support

The number and variety of host facilities or directly controlled bases that may be needed by the U.S. to support military operations in the region is, of course, sensitive to the location, character, scale, intensity, and duration of the conflict. Modern military transportation technologies have greatly augemented U.S. capacity to surge forces non-stop to a distant theater, and to bring high volumes of war material aboard pre-positioned ships into play. But exaggerated expectations or misconceptions of what kinds of missions these capabilities would support, and the extent to which they free the U.S. from reliance on overseas bases, are not uncommon.5/

3) Strategic and Intra-Theater Lift

Certain misconceptions arise from failure to keep in mind the distinction between inter-theater lift (i.e., strategic or long-distance lift) into the theater of operation, and intra-theater lift between staging areas and the battlefield. While intra-theater air and sea lift can deliver cargo to the combat area without specially prepared airfields, bases or ports, inter-theater lift and prepositioned stocks require prepared bases. Host country facilities for this purpose, then, are indeed necessary at the front end of any operation where MAJOR or STANDARD packages are involved. Contingencies employing MINOR packages for brief, low-intensity conflicts may be immune to host facility denial. But as the scope, magnitude or expected duration of planned operations grow, the availability of host facilities becomes a driving factor in operations feasibility. In the early stages of a crisis or conflict, both inter-theater airlift with prepared airbases and prepositioned stocks with some port access may be crucial, but if the conflict persists or entails intense combat with MAJOR/STANDARD packages, sealift resupply and port access will increase in relative importance.6/

In a protracted conflict, even if supplies can be moved into and distributed in the theater without special basing, regional basing arrangements are likely to become necessary to sustain operations. Services for maintenance and repair, medicine, engineering, communications, special engineering, and administration would have to increase. Tactical air support of ground operations may require land-based air facilities. Limited onshore services could be provided by naval forces, but these would be unsatisfactory for many conceivable operations and under some foreseeable conditions might be precluded altogether.

Direct Physical Threats to Host Facilities and Deployed U.S. Forces

1) Preemptive Nuclear Attacks on Host Facilities:

From the attacker's perspective, a nuclear attack on a host facility prior to the expected arrival of U.S. forces would risk much less than an attack on U.S. forces and might -- as its purpose presumably would be -- deter that U.S. deployment. Moreover, such a SNF strike could be just the action necessary to cause other prospective host countries to renege on agreements with the U.S.

2) SNF Strikes on Deployed Forces:

U.S. forces stationed in or deployed to the region offer potentially lucrative SNF targets. While it would be seemingly irrational or suicidal for any government to launch a SNF attack on the forces of a superpower, history supplies instances of smaller power violence against large powers that strain credulity. The year-long confinement by Iran of the U.S. Embassy and diplomatic personnel, and the war that Argentina provoked with Britain are just two recent examples.

The plausibility of such a SNF attack could be greatly enhanced under certain conditions, where the SNF government, for instance, already perceives intense provocation, or presumes immunity either because its strike is anonymous or because it believes it is protected by the rival superpower's nuclear guarantee. Consider the matter of provocation in a reconstructed Iranian context. While a U.S. decision for a hostage rescue operation against a SNF-equipped Iran would have been much more problematic, publicized Iranian brutality against Americans in that event conceivably could have been so acute as to virtually compel an operation, perhaps on a scale that necessitated numerous Iranian casualties. It requires no especially fertile imagination in that case to visualize Ayatollah Khomeini ordering a nuclear reprisal against U.S. naval forces supporting the rescue operation from the Arabian Sea. Nor, given gratuitous Soviet warnings against U.S. intervention in Iran as part of Khomeini's calculus and his apparent emotional detachment from huge human losses suffered in the defense of the revolution, is there compelling reason to presuppose he would be deterred by the prospect of nuclear retaliation.

While this case is suggestive of the dangers of nuclear weapons in one-man dictatorships -- where there may be no one to effectively oppose a nuclear strike decision by a Khomeini or a Qadaffi -- the possibility of weak nuclear command and control systems also exists: an overly zealous commander might think striking an American nuclear force would save his nation or immortalize himself. Whether apocryphal or not, it has been suggested in Indian circles that when the U.S. Enterprise task force rounded the Indian peninsula during the 1971 Indo-Pakistan (Bangladesh) war, Indian Air Force squadron leaders agitated for authorization to engage the U.S. task force -- without nuclear weapons.7/ One can only surmise what they might have tried to do if they had nuclear ordnance.

3) SNF Attacks on Airbases:

The destruction of host airbases would be disruptive to U.S. operations requiring a ground force or air force STANDARD/MAJOR package. Without land-based air protection, ground forces could be vulnerable even to unsophisticated air attack, and military airlift could be similarly disrupted. Table 7 indicates the possible effects of a SNF strike on airbases. To destroy airbase POL storage and most buildings, e.g., control towers, communications centers, hangars, and aircrew facilities, one or two successful SNF sorties might suffice. Nuclear weapons cratering of runways, because of crater size and intense radioactivity, would preclude quick repair. Deployed aircraft are even more vulnerable than the airbase itself. The overpressure from a single 20 KT weapon would destroy all aircraft exposed on the base.

To be effective, airbase air defense would have to operate out at least 6 to 7 kilometers from the base and probably would require an AWACS aircraft and several fighter squadrons. Such a defense would not suffice against a SNF attack employing ballistic missiles.

4) Army Bases:

The availability of host army bases may be less critical than airbases for many U.S. contingency operations. But sustained operations with STANDARD/MAJOR package ground forces would require a secure rear area and staging base. A SNF preemptive attack against one or more host military bases could cripple a U.S. prepositioned force or associated equipment, as indicated by the data in Table 8.

A SNF strike that did little else but eliminate the helicopter force would virtually immobilize local ground force operating capability.

5) Naval Facilities:

The availability of ports and naval support facilities is important to deployed naval forces in peacetime on a day-to-day basis, but might matter less in a crisis, provided the task force has

TABLE 7*

NUCLEAR EFFECTS ON NOTIONAL AIRBASE

Weapon Characteristics			Targets and Radius/Character of Destruction			
Weapon yield	Toss-bomb CEP**(meters)	Detonation Pattern	POL*** Storage	Buildings	Deployed Aircraft	Runways
20 KT	=400	airburst	1.5 km	1.5 km	2.7 km	-
20 KT	"	surface	1.0 km	1.0 km	-	-
50 KT	"	airburst	2.0 km	2.0 km	2.7 km	-
50 KT	"	surface	-	-	-	cratering 86 meters wide, 20 meters deep

* This and the weapons effects tables that follow are adapted from data supplied by Stephen M. Meyer of MIT, based on Glasstone and Dolan, The Effects of Nuclear Weapons (U.S. Department of Defense and Department of Energy, 1977).

** CEP is "circular error probable" or the radius from the aim point within which 50% of the launched warheads would come.

*** POL is "petroleum, oil and lubricants."

Table 8 *

NUCLEAR EFFECTS ON GROUND FORCES

Targets	Lethal Radius-Airburst 20 KT	50 KT	Comments/Other Effects
1. Warehouses, stores, barracks, buildings	1.9 km	2.6 km	Stocks of light equipment, support gear, food, water, etc. destroyed or unusable.
2. Heavy transport equipment (engineering vehicles, tractors, leaders, trucks)	550-600 m	800-900 m	Irreparable damage.
3. Stored light armor/artillery	500-600 m	700-800 m	Unusable.
4. POL	1.5 km	2.0 km	Destroyed.
5. Troops openly exposed	1.3 km	1.9 km	Up to 90% prompt casualties.
"	3.5 km	5.0 km	Debilitating second-degree burns on faces and hands.
6. Helicopters	3.0 km	4.2 km	Destroyed.
7. Electronic systems	-	-	EMP and TREE effects disabling unhardened systems.

Table 9 *

NUCLEAR EFFECTS ON NOTIONAL PORT/NAVAL FACILITY

Targets	Lethal Radius-Airburst 20 KT	50 KT	Comments/Others Effects
1. Loading/unloading and maintenance	800 meters	1.1 km	Rendered unusable.
2. POL	1.5 km	2.0 km	Destroyed.
3. Surface vessels	500 meters	650 meters	Severe damage, sinking, or in need of rebuilding.

* For sources, see footnote to Table 7, p.

not been out of port too long before the crisis begins. But since 90 percent of equipment to support land operations probably would be sealifted, the effects of a SNF strike on a port or naval installation is of interest. The effects are summarized in Table 9.

SNF weapons could also be detonated as shallow underwater bursts to produce "tidal wave" effects. Wave heights at 500 meters from a 20 KT explosion would reach 12 meters, and those of a 50 KT detonation would be 15 meters. These waves would increase in height as they passed through shallower water in a port. The inundation could put the port out of action.

6) Naval Task Force:

A U.S. aircraft carrier-equipped naval task force at sea could be an inviting target for SNF attack because probably only military casualties would result. It would be a more difficult target than fixed land targets because SNF aircraft would have to fly long distances over water, locate the force and then penetrate a thick organic air defense system. SNF submarines would have to penetrate ASW detection barriers. However, nuclear bombs or torpedoes would not have to score direct hits to produce severe consequences.

Carrier aircraft on deck would be destroyed by a 20 KT airburst 2.7 kilometers away; or 3.7 kilometers from a 50 KT airburst. Aircraft below deck probably would be destroyed by amplified blast waves ducted through the elevators. The carrier itself would be crippled by a 20 KT airburst up to 550 meters away, or at 750 meters by a 50 KT airburst. The EMP effects of a surface burst could cripple ship operations from distances of over 2 kilometers, and flash and burn injuries to ship crews could incapacitate battle group operations at comparable distances. A 20 KT underwater detonation within 370 meters of the carrier probably would severely damage the the deck, and smaller ships in that radius could be sunk.8/

7) Ground Operations:

The battlefield effects of nuclear weapons on troops and armor in the NATO theater context has been extensively covered in the literature.9/ But defense planners are not accustomed to determining the effects of SNF attacks, which might involve only a handful of weapons against battalion instead of division size operations. In some respects, the simpler military environments of non-European states may make battlefield nuclear employment more credible (and feasible) than would be the case in the European environment. SNFs could be used on the battlefield in three ways: (a) as nuclear barriers; (b) to attack troop and armor concentrations; and (c) to interdict rear area staging and support facilities.

Nuclear mines, or atomic demolition munitions (ADMs), could be used in many parts of the Middle East and South Asia to block mountain passages from use by armored vehicles and heavy road equipment. The shallow subsurface burst of a 20 KT ADM would produce a crater 120 meters or more in diameter, and 35 meters in depth,

while the radioactive ejecta would form a radioactive barrier again as wide on all sides of the crater. Radioactive fallout might occur over a much wider area, the distances depending on local weather. Conventional weapons, albeit in larger numbers, could also block mountain passes with rubble, but clearing operations would be easier and less hazardous than after nuclear detonation.10/

A SNF country conceivably would perceive nuclear ADM use not as an attack on U.S. forces but rather as a demonstration of resolve that need not provoke nuclear counteraction.

With respect to possible SNF attacks on U.S. troops and associated equipment in combat formation, the rule of thumb seems to be that a 20 KT airburst would render ineffective an infantry battalion. Two weapons would be required if an infantry battalion is in column march formation. Exposed troops would suffer immediate death out to a 1.1 kilometer radius, and tank and APC crews would be killed instantly within 800 meters. Further out from ground zero, shock and radiation sickness would produce numerous casualties. Dispersion of forces to counter a SNF threat would make U.S. forces more vulnerable to enemy conventional attack.11/

The nature of the geography and economic development level of the region should be kept in mind. SNF interdiction of logistics and rear area support would cut off ground forces from food, water, fuel, ammunition and support services. In many parts of this region, these supplies would not be replaceable by commandeering indigenous resources. SNF strikes could deny air support for ground operations. Carrier-based tactical air support, if available, would not fully compensate, and in certain locales (e.g., far up the Persian Gulf), may not be employable.

8) Naval and Air Operations:

The vulnerability of amphibious assault forces to SNF strikes will depend on the nature of the assault (i.e., grouped vs. dispersed landings) and the phase of the approach in question. The air defense coverage of the carrier group for an assault force would diminish as the assault ships move towards shore. Assault ships within 450 meters of a 20 KT airburst would be sunk, but prompt radiation would be lethal to exposed troops out to 1.1 kilometers, and to troops sheltered by the hulls of assault ships out to 800 meters from the detonation point.

Subsurface bursts in the water around or behind an amphibious assault group as it approaches shore could destroy a landing operation. A string of suitably spaced shallow underwater bursts behind the assault ship could break up even a dispersed landing.

A more sophisticated state might be able to deploy nuclear-equipped air defense missiles to attack air-assault formations in flight. A 20 KT surface-to-air missile (SAM) could clear the skies of aircraft within 1.1 kilometers of burst point, or 1.5 kilometers with a 50 KT warhead. Such a SNF could clear a 2-3 kilometer air corridor, albeit only for a short period of time.12/

Nuclear and Non-Nuclear Threat Comparison

As the Middle East, Falkland Islands, and Iran-Iraq wars show, modern conventional weapons can be very lethal and, as is also the case with chemical weapons, can be acquired more easily than even primitive nuclear weapons. This raises the question of whether the emergence of SNFs will add much, if anything, to existing or evolving non-nuclear capabilities and threats, or what, if anything, is different about SNFs.

In the time considered, regional states may be able not only to acquire much larger inventories of tactical aircraft but also more intelligent munitions (i.e., better guidance), better tailored munitions (i.e., anti-runway munitions), and area munitions (i.e., fuel-air high explosives and cluster sub-munitions) that would increase the effectiveness and lethality of each sortie, bringing down the minimum size of any conventional assault.

Chemical weapons could also be employed to close down airbase operations. The use of persistent agents could impede aircraft service, cargo loading, and general base operations, unless suitable chemical defense and decontamination equipment are available, and even then substantial casualties could disrupt operations.

The effects of advanced conventional and chemical weapons attack on army bases and ports would be similar to those for airbases.

The Falklands war demonstrated that modern ships are highly vulnerable to modern missiles. In a carrier group, it is important to recall, it is not necessary to sink a carrier, merely to stop air operations, to render most other ships in the group nearly useless.

Superficially, the immediate effects of SNF and modern non-nuclear strikes seem roughly equivalent -- most military operations can be halted and recovery hindered. But here the similarities end:13/

1) Size and Scope of Sorties:

Many dozens of non-nuclear sorties would be required, in most instances, to achieve immediate effects equivalent to that of a single nuclear weapon. A SNF of a dozen or more weapons could pose a credible threat to several regional facilities simultaneously. A very large tactical air inventory would be needed to pose the same threat by conventional means.14/ A SNF could rely on missiles for delivery, while a non-nuclear force would be tied to aircraft for most interdiction or assault missions.

2) Synergism of Effects:

A nuclear strike allows time compression and continuity of destruction, and provides overlapping of various kill mechanisms.

Non-nuclear strikes usually take longer to accomplish a mission and produce discrete rather than continuous destruction. A nuclear burst will "insult" the target with thermal effects, blast effects, radiation effects, and electromagnetic effects, while non-nuclear munitions tend to maximize a single vulnerability of a target.

3) Destructive Magnitude and Recovery:

Runway cratering from HE bombardment usually can be repaired fairly promptly. Nuclear surface burst craters are not so easily filled and paved over.

Chemical effects can be cleaned away in a few days. Intense sun and low humidity in much of this region could aid the process. Chemical attack operations would have to be repeated fairly frequently.

A near miss by a nuclear weapon is as good as a direct hit in most cases.

4) Susceptibility to Active and Passive Defense:

Non-nuclear missions are much more easily negated by active and passive defenses. The need for multiple sorties can make fairly low attrition rates in a raid quickly unacceptable. Passive defense against non-nuclear munitions is more economical and can be more certain than against nuclear effects.

Active defenses that allow a single nuclear weapon to penetrate must be considered as having failed completely. Passive defense is technically feasible against nuclear weapons for some purposes, but is more complex, expensive, and uncertain in performance.

5) Psychological Effects on Decisionmakers:

Nuclear weapons are perceived to represent a more incalculable threat. Non-nuclear threats are as likely to drive a target country toward as away from association with U.S. security commitments, but nuclear threats may weigh more unequivocally toward dissociation. Conceivably the U.S. could offer nuclear security guarantees, but this probably would be less likely than, and even when offered, not as credible as, conventional security commitments in the present environment.

In sum, the introduction of SNFs in the Middle East and South Asia will not give rise to categorically new direct threats to U.S. military operations in the region. But it will extend the scope and magnitude of existing direct threats along a nuclear dimension. Long term effects on military operations will be increased significantly, and decision-maker perceptions of their utility may be inhibiting.

Implicit Effects on U.S. Military Operations

In addition to direct threats, SNFs may affect U.S. military

planning and operations implicitly. This becomes clearer when one considers the possible security needs and demands of U.S. friends and allies in the region, the Soviet role in the region, and how the potential interactions between SNFs, friendly and hostile, might impinge on the superpower balance and possible operations in the region.

1) Contingencies with Soviet Involvement

A major emphasis in U.S. planning concerns contingencies in which U.S. military forces may be needed to block a Soviet military advance -- or an advance by a Soviet proxy -- in the region.15/ SNFs would greatly complicate U.S. contingency response if the Soviet proxy possesses a SNF, if the target of Soviet (or proxy) military action is SNF-equipped, or if both the proxy and target have SNFs.

A nuclear-armed Soviet proxy could pose a credible threat to U.S. forces being deployed or operating in the region. One question that the U.S. would face is whether to consider or declare a use of the proxy SNF against U.S. forces as a Soviet use of nuclear weapons against U.S. forces. A prior declaration might cause the Soviets to bridle their proxy. But if the proxy SNF use nonetheless occurred, the U.S. would face a dilemma of how to respond to a "Soviet" nuclear weapons use.

The problem would be acute if hostilities involving U.S. forces already were underway. Such proxy SNF use would have the appearance of Soviet escalation across the non-nuclear/nuclear firebreak. The pressure on U.S. decision-makers to destroy the remainder of the SNF, preferably with conventional weapons but using nuclear weapons if needed, would be severe.

If a SNF had attacked and destroyed deployed U.S. forces, moreover, it could leave the U.S. without conventional force options to meet a sudden Soviet non-nuclear offensive in the region. The net effect in this case of the SNF proxy's attack (which might not have had Soviet sanction) would be to force the U.S. to choose between nuclear resistance to the Soviet offensive or permitting Soviet takeover of the region.

A U.S. ally with a SNF could pose equally perplexing problems for the U.S. Such an ally might threaten to use its SNF unless the U.S. intervened to neutralize some military threat. Reported Israeli preparations to use nuclear weapons in the 1973 war are illustrative.16/ The U.S. intervention so demanded might be merely arms resupply or it might be injection of MAJOR force packages. Pakistan or Israel, for example, might threaten to use nuclear weapons against encroaching Soviet forces unless the U.S. intervened to block the Soviet advance by conventional means. The choice posed would be between standing by while an ally launches a nuclear attack on Soviet forces and perhaps endure Soviet retaliation in kind, or interposing U.S. forces in a shooting war with the Soviet Union. Such a scenario might be treated as a litmus test of U.S. credibility elsewhere (i.e., Western Europe).

Where both U.S. allies and Soviet proxies in a confrontation possess nuclear weapons, the potential for crisis escalation is particularly high. SNFs are likely to be small and vulnerable, with fragile C3I, and thus most useful when used in conjunction with national non-nuclear forces. Hence, there will be strong incentives for preemptive first use of nuclear weapons. The complex dynamics of a SNF confrontation, pressures on the U.S. to "take out" a Soviet proxy's SNF, pressures on the Soviet Union to eliminate a U.S. ally's SNF, and U.S. apprehension about Soviet military operations in the theater represent an explosive combination. At a minimum, this type of confrontation might finally legitimize the introduction of Soviet forces into the region -- i.e., to head off a nuclear holocaust.

2) Contingencies Without Soviet Involvement

The Iran-Iraq war is a model for risks posed by military conflicts to U.S. friends and allies in circumstances where they are not directly involved. The fear in Kuwait and Saudi Arabia of a "spill-over" of air raids and other operations prompted U.S. redeployment of forces in the region to provide both a deterrent and an early warning system.17/

Had either or both belligerents possessed a SNF, pressure could have mounted on the U.S. for more direct military intervention. U.S. allies on the sidelines might have demanded U.S. action to remove the SNF threat independently of the resolution of the larger confict. Other dangers would arise if U.S. allies threatened to intervene unilaterally, especially if they possess SNFs themselves.

Since this scenario is in a region nearby the Soviet Union, a further complication is that U.S. military intervention might put pressure on the Soviet Union to intervene also, so that SNF crises without initial Soviet involvement could evolve into a U.S.-Soviet confrontation.

The contingencies outlined above pose serious risks of U.S.-Soviet nuclear confrontations which transcend traditional escalation theory, since neither the U.S. nor the USSR, in these instances, raises the threat of first nuclear use. The uncertainties are compounded in the cases where the crisis is not precipitated by an initial Soviet move on the region, for both superpowers then are reacting to events -- none is "in control."

The uncertainties in such scenarios may force U.S. decision-makers to choose between partially decoupling U.S. military involvement in the region, and preparing to undertake preemptive strikes against SNFs to remove an essential cause of the uncertainties. Since the prospect of successfully executing preemption against a SNF will decline as a crisis evolves, U.S. decision-makers may be forced more often to contemplate initiating hostilities, or accept the cutting of losses.

PART THREE—EXTRA-REGIONAL ISSUES

Chapter Five

WESTERN ALLIANCE ISSUES AND RESPONSES

The impact of SNFs in the Middle East and South Asia on U.S. security interests should take account of how SNF proliferation in this region will be viewed by Western alliance members. Their perceptions and responses could affect U.S. security interests not only in this region, but perhaps even more profoundly in Europe, with implications for the stability of the East-West strategic balance.1/

Key Issues

U.S. national security and East-West balance stability depend on the contribution the principal states of Western Europe make to the North Atlantic alliance and thereby to the common defense against the Soviet/Warsaw Pact threat. The integrity of the alliance is subjected to pressure from Soviet diplomatic, arms control and trade policies, as well as the military threat. It is also susceptible to stress from the differing national interests of alliance members over alliance issues (e.g., burden-sharing, theater nuclear force modernization) and non-alliance issues (e.g., domestic politics, domestic energy policy, and foreign policy toward regions outside Europe). Certain issues, international energy policy for example, are of special importance to Western security in the broader sense, and thus influence member state roles in the alliance, even though these issues are not strictly speaking part of the definition of alliance responsibility. West European energy dependence and economic security issues are of special concern as they relate to the Middle East, of course, and carry potential military implications.2/

SNF proliferation in the Middle East/South Asian region raises two central issues in the alliance context. The first concerns how the European alliance members will perceive or otherwise be affected by this proliferation and what impact this in turn will have on both the cohesion and strength of the alliance and the elements of stability in the East-West balance which depend on alliance credibility. The second central issue concerns how European responses to proliferation and to the region of proliferation will evolve, and what this then implies for U.S. security interests and military operations there.

SNF threats from the Middle East/South Asian region are unlikely to arise as direct military threats to the alliance, but they may take the form of direct threats to the territories or assets of particular alliance members. As such, they could have indirect effects on the alliance and more broadly on Western security. Similarly, direct SNF threats to oil or important friends and allies in the Middle East would pose indirect threats to the alliance. However, direct SNF threats to oil would pose direct threats to European energy and economic security, and would have profound

ramifications for long term defense capability. For this reason, it may also have a major bearing on near-term military planning for selective Western military cooperation in the oil-producing regions, albeit probably distinct from the alliance per se.

General European Perceptions

The initial European response to SNF proliferation in the Middle East is likely to be extreme anxiety based more on the fact of proliferation per se than on the specifically military threats to territory or assets in Europe that might be adduced.

This anxiety would arise partly from the commonly held belief in Europe that nuclear proliferation is extraordinarily destabilizing, politically as well as militarily. It would partly arise also from European concerns about the added impetus to terrorism and the delicate sensitivities associated with nuclear policy in Europe, both in the peaceful nuclear energy and the NATO theater nuclear force modernization contexts.

The European "peace movement," which focuses opposition to nuclear weapons, has tended to draw support from the ranks of anti-nuclear activists who also oppose the expansion of nuclear energy, partly on environmentalist grounds. These movements could eventually constrain European energy and economic security as well as military defense choices. Directly or indirectly, therefore, they tend to undermine the alliance in fundamental ways.3/

The fact of proliferation, i.e., unmistakable proliferation events, in the Middle East/South Asia could add considerable impetus to these movements and the unfavorable security consequences that would arise from implementing their objectives. This would be more likely if European national responses are seen to be confused or overly indecisive. But it is possible that the manifestation of proliferation in a neighboring region could also focus policy maker attention on the dangers and lead to a response of a more coherent sort that would safeguard or even strengthen the alliance.

SNF Direct Threats

Given the relatively short air and sea distances between North Africa or the Middle East proper and the southern states of Europe, it is foreseeably possible that SNF threats of use, or actual nuclear attacks, could be launched against cities, ports or other assets in Spain, Italy, Greece and Turkey, all NATO members.

These southern European states are crucial to NATO defense planning for the southern flank. They are also somewhat less politically stable and, except for Italy, less effectively integrated into the European common market and political community than their principal European neighbors to the north and west. Moreover, between two of these states, Greece and Turkey, there is an intense, protracted political and military dispute.

The most worrisome response that one or more of these states might make to nuclear proliferation in the Middle East is a decision to independently develop a nuclear force of its own. A Greek or Turkish move in this direction would probably be matched by the other, and possibly set Italy thinking about a similar course. Proliferation in southern Europe in turn conceivably could stimulate nuclear weapons interest in West Germany, though the chances that such interest would achieve official backing probably are very remote. Any additional national nuclear forces in Western Europe would be of concern to the Soviet Union, but particularly so if one materialized in West Germany. This could have destabilizing effects on the European theater and East-West strategic balances.

Short of additional proliferation in Europe itself, neighboring proliferation could be divisive within the alliance, either because the direct threats are disproportionate to the southern states or because the national responses within the alliance differ widely and perpetuate controversy.

SNF Indirect Threats

The indirect threats to the alliance from Middle East/South Asian proliferation arise from the added potential for highly destructive conflict in the region, the consequences for political instability, the related dangers to oil and international commerce and finance, the increased opportunities for Soviet military expansion in the region, and the added potential for nuclear escalation of possible U.S.-Soviet military confrontations.

Most European alliance members are conscious of these regional dangers. Those that are disproportionately dependent on imported energy -- especially France, Italy and West Germany -- are acutely aware of their vulnerability on this dimension for the next decade or two. But their perception of how these dangers should be coped with is different from that of the United States in certain respects.

As a general rule, West European governments seem to expect the primacy of the Western alliance to be recognized, i.e., as the key not only to the military defense of Western Europe but to the preservation of the strategic balance. Their own military contributions to NATO or the common defense will continue to be concentrated in that sector.

Insofar as military responses are necessary for Western security interests in the Middle East, the behavior of European members of NATO seems to suggest that they expect the United States to shoulder most of the task by itself. The Europeans expect through consultation to influence how the U.S. performs this task, especially where it draws down capabilities prepositioned in or earmarked for NATO contingencies. Most do not foresee substituting their own national military efforts. Whether they will associate themselves with U.S. military preparations or emergency operations varies somewhat by country and also depends on the gravity of a real or expected crisis. When the strategic military stakes are not

extraordinarily high some, perhaps most, West European states will expect to dissociate themselves from U.S. projection of military force. If the chips are down, however, such dissociation may be more the exception than the rule.

There is yet another difference. The Europeans are somewhat more prone than the U.S. to the view that political and commercial influence are more decisive than military instruments for securing Western interests in this region. This could be a reflection of European relative disadvantage in the military means at their disposal. At any rate, it leads Europeans to emphasize non-military and economic diplomacy as their preferred field for contribution to common security problems outside the NATO theater.

The same views condition how the Europeans perceive the regional proliferation problem, and are likely to condition their responses. Insofar as the SNF proliferation problem takes the form of military threats, many Europeans will be inclined to insulate NATO and to shift the responsibility for coping militarily with those threats to the U.S. Their own responses are likely to be primarily political and economic in nature.

In general, then, the European responses to the indirect effects of proliferation in the Middle East/South Asia are likely to involve an interest/policy mismatch and perhaps some tendency toward further military decoupling from the region in the face of SNF proliferation.

Summary

The threats posed by proliferation to the alliance, as they are perceived by Europeans, will add to and aggravate existing problems that the alliance faces, but proliferation by itself is unlikely to dominate European security perceptions. Proliferation does represent a spectrum of threats potentially destabilizing to the alliance, but could also be a factor conducive to greater cohesion among alliance members as to how to deal with proliferation itself. While Europeans will try to shift the burden of any military response to proliferation to the U.S., they could become more amenable to concerted, vigorous efforts in non-military policy to contain proliferation at the front end.

Chapter Six

ISSUES OF SOVIET PERCEPTION AND RESPONSE

A key factor in assessing how SNF proliferation will affect U.S. security interests in the Middle East/South Asia is how the Soviet Union will respond. Likely Soviet response is particularly difficult to fathom. There is little past Soviet behavior with respect to explicit proliferation by which future Soviet behavior might be gauged. Moreover, Soviet response specifically to proliferation will be difficult to disentangle in this volatile and exceptionally sensitive region from broader Soviet ambitions or from its responses to the politics and security conditions of the region as a whole.

Major Issues

There is evidence to suggest that the Soviet Union will fear and therefore resist proliferation in the region, but probably not resist it at the expense of many other interests in the region. It also seems improbable that the Soviet Union would encourage proliferation directly or explicitly, but it may be inclined after the fact to exploit SNFs in a proxy role in the case of client states. As with the U.S., the Soviet Union will also give consideration to how proliferation would affect its own military forces and operations.1/ This suggests several issues:

- What does the past Soviet record on proliferation and nonproliferation imply for this region?
- How may Soviet interests in this region change so as to have new consequences for the rate and scope of proliferation?
- How far might the Soviet Union go to exploit SNF proliferation after the fact in the pursuit of other interests in the region?
- What Soviet force structure or military planning adjustments are likely to deal with SNF proliferation? How might Soviet perceptions of U.S. and Western military responses to SNF proliferation condition Soviet military adjustments?
- How are the Soviet leaders likely to treat the problem of crisis management in the environment of proliferation in this region?

These are important issues and deserve inquiry in greater depth than has been possible here, but tentative judgments are offered below.

The Soviet Record on Proliferation and Nonproliferation

On matters of principle, international controls and export regulation, Soviet nonproliferation policy today is about as strong as it is anywhere in the West. In the East European bloc, overall Soviet dominance as well as the specific provision for return to the USSR of spent nuclear fuel appears to make Soviet views on nonproliferation decisive. Postwar Soviet provision of sensitive nuclear technology and perhaps nuclear weapons design assistance to the People's Republic of China was later regretted and so far has not been repeated elsewhere.2/

Soviet support for international nonproliferation arrangements became much stronger in the mid-1960s, making the conclusion of the Nuclear Non-Proliferation Treaty (NPT) of 1968 feasible. Soviet concern about the possible nuclear-arming of West Germany was a critical factor in eliciting Soviet support then for independent IAEA safeguards verification under the NPT in the non-nuclear states of EURATOM.3/ Subsequently, the Soviet Union strongly affirmed the Nuclear Supplier Group (London Club) guidelines and appears to have conformed thereafter to those guidelines in its nuclear export policy. U.S. and Soviet policies in the IAEA in the 1970s have been substantially the same. Only recently have some differences appeared over the issue of recognizing the IAEA credentials of certain states, notably South Africa and Israel. Even here, the Soviet posture is consistent with nonproliferation objectives in the countries in question, except that the politicization of the IAEA, arguably, may have adverse effects on non-proliferation objectives generally.

While the Soviet nonproliferation record today is quite commendable, it has improved by evolution. In the past and even today, certain Soviet nuclear practices abroad leave room for skepticism about how consistent Soviet practice and Soviet declaratory policy regarding proliferation may be over the long run. Had the Soviet effort to emplace nuclear missiles in Cuba in 1962 not been blocked, the proliferation consequences in Latin America could have been very serious indeed. Soviet nuclear export commitments to Cuba and Libya of the last few years, though implemented slowly and probably with Soviet pressure for nonproliferation assurances, leave Western observers and neighbors of those two countries uneasy.4/ Soviet nuclear cooperation with Egypt and Iraq, moreover, provided some of the initial inputs to their nuclear research programs. While the Soviets probably expressed disapproval when India detonated the 1974 nuclear device, they did so very quietly. It should be noted in this connection, however, that Soviet supply of heavy water to India in 1977 was accompanied by insistence that India accept attendant IAEA safeguards that are much more specific and stringent than any agreed to by India previously.5/

Soviet nonproliferation policy, moreover, appears to be the responsibility of highly compartmentalized Soviet officials. It is not clear that nonproliferation concerns penetrate the Soviet defense establishment. It seems doubtful, finally, that nonproliferation is accorded high priority as a rule, or that the Soviets would risk much

compromise to other interests by using coercive nonproliferation policies unilaterally, at least not outside the East European bloc.6/ If, for instance, there has ever been Soviet consideration of preventive (or preemptive) military action against Israeli nuclear facilities, it has been well-concealed. In the case of China, this sort of prevention issue may have been a live one in 1969, but the Soviet decision evidently was negative.

Possible Change in Soviet Interests

Changing Soviet interests conceivably could affect the rate and scope of proliferation in this region. They could also lead to much more extensive military involvement in this region for reasons quite separate from proliferation.

Soviet investment in domestic nuclear energy development is considerable and does raise the question whether Soviet nuclear export activity may become much more extensive in the next two or three decades.7/ If it were to, Soviet political and commercial interest in nuclear sales or in fostering technical nuclear dependence might contribute to the spread of nuclear weapons capabilities in this region. Soviet political interest in nuclear sales cannot be discounted -- as the Libyan case demonstrates. But extensive Soviet nuclear commercial opportunities are doubtful because Soviet domestic nuclear power targets are so ambitious that power reactor manufacturing capacity probably will be fully absorbed by domestic demand.8/ Moreover, Soviet nuclear power technology probably would not be found as attractive on safety grounds as that available from other suppliers.

Soviet interest in Middle East energy, however, could increase Soviet political and military involvement, quite apart from proliferation. Increases in Soviet oil production capacity appear to be flattening out and may decline, reducing Soviet export capacity for East Europe, or to the West for hard currency. The Soviet Union may, therefore, attempt to position itself to be able to reroute Persian Gulf oil to East Europe, or to its own southern republics, as compensation for supplies exported to the West.9/

Soviet Perceptions of SNF Proliferation in the Region

The Soviet Union undoubtedly would find SNF proliferation in a neighboring region disagreeable, potentially threatening to its own territory, a potential threat to its military forces and operations in the region, and a source of additional risk in any military confrontation with the U.S. It may also view with displeasure the increased sense of autonomy and capacity to resist Soviet pressure that SNFs might endow countries of the region with.

The question is whether the Soviet Union may reach a point, however, at which it decides that selectively assisting potential proliferators with nuclear weapons assistance is necessary, or that SNF proliferation has proceeded so far already that Soviet interests dictate proxy influence over SNFs wherever possible.

Part of the answer to this question depends on how the U.S. and other Western countries deal with the same issue. The Soviet Union evidently already attributes Israeli, South African and now Pakistan's nuclear weapons capabilities to tacit nuclear assistance from the U.S., France or elsewhere in the West. Should a regional SNF ever be used unmistakably as a Western proxy, against Soviet interests or a Soviet ally, the Soviet Union could be tempted all the more strongly to follow suit.

The Soviet Union is much less likely to instigate SNF proliferation than to exploit it after it has occurred. It is true that Soviet arms transfer arrangements include the supply of dual-capable equipment, e.g., FROG and SCUD missiles. There is little evidence that the Soviet Union, possibly Cuba apart, has stationed nuclear warheads on land outside its own territory, or considered outright transfer of control over nuclear warheads to a Third World ally. It seems unlikely this pattern will be broken, short of the outbreak of general war.

A more likely Soviet approach to regional arms recipients with which it has established a special relationship is to hint at Soviet willingness to use its own resources to provide the recipient with protection against nuclear threats or nuclear attack.10/ Such support could take the form of a security guarantee or even extended deterrence, but it could also be vague or so highly conditional in terms of its nuclear connotations that it would be difficult for the recipient to put it to a test.

Even if the U.S. and Western countries clearly refrain from proxy use of SNFs in this region, the Soviet Union may feel compelled, partly because of its own proximity to these SNFs, to ensure that they are primarily targeted on or tied down by each other. This could mean aiding a proliferant after the fact, perhaps not so much with nuclear warhead development as with improvements in C3I and delivery that are intended to enhance the SNF credibility, reduce its vulnerability to preemption, and even reduce the likelihood of its first use, or use without Soviet consent. But in this connection, the Soviet Union surely would take advantage of the tensions introduced by local SNF balances to extend its political influence in the region.

Soviet Military Planning Adjustments

If SNF proliferation occurred today in the Middle East/South Asia, the Soviet Union would need to make only marginal adjustments in its land-based force structure to cope with new SNF threats. Ever since the introduction of the SS-4/SS-5 missile in the early 1960's, the Soviets have targeted the Near East/South Asia region, and also have deployed significant ground and air forces in that area.11/ Moreover, the Soviet Union has been living with a real albeit much larger SNF -- the Chinese force -- since the late 1960s or early 1970s. The Soviet forces deployed in Central Asia and Siberia beginning in 1964 were significantly enlarged, at least partly with Chinese nuclear capability in mind.12/ To supplement the regional

missiles, the older SS-4 and SS-5 and a significant number of ICBMs are targeted against this region as well. Most recently, mobile SS-20s have been deployed to provide target coverage of China, and the most modern Soviet tactical bombers have also been introduced along the borders.13/ These forces provide deterrence, and also potential preemptive or suppression options.

Soviet air defense systems are already prolific around key cities and the industrial belt which runs through the south-central region. The advent of new strategic missile-equipped SNFs in the region might stimulate renewed Soviet interest in anti-ballistic missile (ABM) defense. But ABM response would not be a foregone conclusion. It evidently was not regarded as a critical requirement (except, perhaps, around Moscow) for response to the Chinese force. Strategic arms control conditions in this case probably are an inhibiting factor.

The potency of regional SNFs could increase over time, but in an evolutionary fashion. Soviet military planners would be able to adjust to more sophisticated SNF threats incrementally.

The more difficult questions relate to how the Soviet Union would configure its land-based forces in a proliferated environment for contingencies where U.S. intervention might be expected north of the Persian Gulf. For these contingencies, Soviet planners may wish to have improved reconnaissance and intelligence capabilities to be able to distinguish immediately between SNF actions and potential U.S. nuclear employment in the region.

Soviet naval improvements for nuclear defense against regional SNFs raise other considerations. But Soviet preferred solutions to this problem are at least as likely to be prompt access to or control of regional airbases, so as to provide naval protection by tactical air cover, as they are to be improvements in the active defense systems of naval forces per se. With respect to the latter, however, the recent trend of Soviet aircraft carrier acquisition may also be significant.14/ Until Soviet naval forces acquire more effective capabilities for operating at long distances from home ports, the Soviet need for local naval facilities will parallel that for airbases.

Crisis Management

The installation after the 1962 Cuban Missile Crisis of the Washington-Moscow hot line, and specific parts of the SALT agreements, indicate a measure of serious Soviet interest in bilateral arrangements for the reduction of the risks of nuclear war in superpower crises.

SNF proliferation may increase Soviet incentives for improved crisis prevention or crisis management arrangements. Probably this would not by itself lead to joint military measures to prevent proliferation, but it may, against a back-drop of joint consultations about the dangers in specific instances of proliferation, increase

Soviet interest in developing capabilities for unilateral prevention of SNF proliferation, capabilities which when employed would be easily distinguished from major military movements that might require a Western response.

Once one or more SNFs have been deployed in this region, however, the Soviet Union may become receptive to periodic consultations with the U.S. in a non-crisis atmosphere. Such consultations could have the aims of clarifying mutual comprehension of the conditions under which the superpowers could be involuntarily entangled by their friends or allies, or by anonymous triggering actions of other states, in a conflict over which they stand to lose control, and formulating procedures that could minimize misperceptions of the intent or moves of the other side in a crisis, thus inhibiting or slowing the pace of moves that could result in direct superpower confrontation or escalation to nuclear use.

PART FOUR—POLICY IMPLICATIONS

Chapter Seven

DEFENSE PLANNING AND POLICY IMPLICATIONS

Thus far the central thrust of this study consists of an assessment of the threats and consequences of SNF proliferation as they impinge on U.S. security interests in the region and adjacent theaters. The assessment highlights the physical and political dimensions of the threats, and the risks and costs of nuclear war they pose to countries in the region, to allies in Europe, and to U.S. military forces and operations planned for the region. Describing the potential capacity of SNFs for impeding or disrupting U.S. forces and operations provides a more tangible basis for expressing U.S. defense planning implications than would a more abstract analysis of proliferation dangers.

Though this concluding chapter emphasizes the U.S. defense planning implications of SNF proliferation in the region, it is important to keep in mind that defense planning is inseparable from the broader context of U.S. foreign policy, including nonproliferation. U.S. military instruments will be used in accordance with foreign policy guidelines that aim to maintain the stability of the central strategic balance; deter nuclear or general war; protect allies and friends from depredations; and secure physical assets and lines of communication that are vital for economic security. Arms control and nonproliferation policies aid these objectives by reducing uncertainties, limiting destabilizing military capabilities, and preserving freedom of action from unmitigated risks of nuclear or general war. Defense planning is an indispensable but special subset of this larger policy context.

Proliferation and Defense Planning: Scope of the Problem

Nuclear proliferation presents special problems for U.S. defense planning. The added risks in terms of potential losses to U.S. forces, damage to allied nations, and possible escalation to superpower confrontation and conflict are immense. Proliferation threats are not controlled by the careful process of deterrence now established between the superpowers. SNFs can face the U.S. with a wide range of contingencies that its forces have not been designed to fight. This is particularly true in the Middle East and South Asia.

U.S. defense planners also face serious resource constraints in implementing existing force plans and goals.1/ Thus the issues of time and resources are important in deciding what may be done now and what could be done later, as a practical matter, to enhance military capabilities to address proliferation threats. In general, this puts a premium on identifying low cost/high priority options, and on distinguishing near term and long term priorities.

As long as the pace of SNF proliferation in this region remains slow (bearing in mind that it is slow in the Middle East and Gulf, but faster in South Asia), the force planning effort called for may be modest and incremental. But it is important to keep in mind that many of the weapons systems and capabilities that U.S. forces will deploy 20 years from now are entering the concept development stage today. Pre-planned and product-improvement programs may provide some safeguards, but possibly insufficient ones, against locking in the structure and versatility of U.S. forces to criteria established today. It should be useful therefore to take account of SNF threats judiciously, even in current force planning criteria.2/

Cognizance of SNF threats in current planning would also put that process much further ahead on the power curve in the event that the pace of SNF proliferation accelerates, a possibility which should not be overly discounted in this region. Interstate nuclear weapons transfer could upset a prognosis focused on regional state indigenous development.

New Defense Policy Questions

It is not too early to consider fundamental policy questions that actual SNF proliferation will raise. One is the issue of nuclear security guarantees. Apart from special allies, the U.S. has declined to provide non-nuclear states with nuclear security guarantees as adjuncts to conventional security commitments. The U.S. may have to decide whether it will offer nuclear protection to important local allies or host states in the region, once they are faced with SNF threats, and, if not, what it would offer alternatively.

A second issue is how the U.S. will respond to direct threats posed by SNFs to U.S. military forces in the theater. No doubt, there would be active air defense and other conventional defense responses but these would not be sufficient or conclusive necessarily against SNF attack, since even a small SNF leakage rate could be highly disruptive to operations. Another possible response would be open introduction of U.S. theater nuclear weapons to the region, to deter SNF use against U.S. forces or host states. An open or declared nuclear response would be problematic and might be more damaging than helpful. It would alarm regional friends and allies by suggesting that the region could become a nuclear battlefield. It could also have the undesired effect of making U.S. military operations more complicated and sluggish due to command, control, and physical security concerns. It could exacerbate the SNF proliferation by providing local states with a legitimizing pretext to develop and deploy SNFs. Finally, it could become an unwanted stimulus to greater Soviet military effort in and about the region.

A third problem as SNF capabilities spread will be how to reconcile competing interests in (1) preventing SNF proliferation from occurring, (2) attempting after the fact to "stabilize" SNFs or neutralize their destabilizing effects, and (3) deterring and defending against SNF threats. The first two of these interests are

usually associated with arms control policy. But they may need to be considered in the force planning context also.

Ordinary nonproliferation policy measures will have failed when SNFs emerge, at least in those particular cases. Ultimately, it may fall to the use of military force to prevent SNF proliferation. In that case, prevention would become a practical defense planning problem. It should at least be of theoretical interest, even now. The military costs of deterring or defending against established SNF threats, or even of attempting to stabilize local control over SNFs, may be appreciably greater than the costs of arresting the development of SNFs by conventional military means in order to neutralize the problem at an earlier stage.

Force-Sizing Requirements of SNF Contingencies

SNF scenarios which could grow out of the present trends in the region (see Appendix D) suggest that the most important SNF-related requirements for U.S. force planning are:

- high quality human and technical intelligence tailored to fighting complex nuclear wars;
- near real-time capability to locate and strike at nuclear weapons with conventional munitions;
- highly detailed pre-war strike planning for local contingencies in which there is a major possibility of first use by a SNF power;
- long-range air forces which do not depend on forward bases;
- a wide range of nuclear and advanced conventional strike capabilities to fight fairly intensive conflicts;
- ability to rapidly strengthen air and missile defenses in the area;
- highly mobile, small-scale ground forces;
- freedom from dependence on a few fixed bases or staging points.

Existing U.S. force planning priorities for this region -- gauged to Soviet threat contingencies -- either already cover many requirements implied by SNF scenarios or stretch U.S. resources and forces to their limits. The U.S. is already attempting to improve its capability to project power into the Gulf and develop basing facilities, deploy sea-based prepositioning, and expand its sea and airlift capacity.3/ The assessment of potential SNF threats provides added justification for sustaining most existing U.S. force improvement priorities in the region. But SNF threats raise

additional issues for long lead time defense planning in at least three areas: (1) intelligence and C3I; (2) regional nuclear war planning software; and (3) deployment capabilities.

Long Lead Time Priorities

1) The Problem of Intelligence and C^3I:

The long term risks posed by SNFs reinforce the existing need for highly sophisticated near real time intelligence assets to analyze large-scale conventional combat, and to support U.S. military intervention. The need for real time report back and analysis will increase as forces in the area become more complex and their reaction times grow shorter. The augmentation of human intelligence, foreign language, and analytic skills is a subject of controversy, but would be a logical step for coping with SNF crises in this region.

SNF threats pose the need, for force survivability, to start a cost-effective, phased program to improve the hardening of U.S. military gear for this region over the next ten years.4/

For short reaction time, improvement is needed in the U.S. ability to detect, characterize, and analyze the effect of nuclear strikes in the region. The requirement for accurate coverage of the Middle East, Gulf, and South Asia will rise. To react quickly to control or fight in a limited nuclear war, the U.S. needs the ability to detect and identify the source of nuclear explosions with high reliability. The nature of key fixed targets in the area -- whether oil facilities, airbases or capital cities -- suggests the need to be able to locate nuclear explosions within one kilometer, to characterize low yields to within 2 to 3 KT, and to correlate nuclear detection data against up-to-date target overlays and weather conditions. The high probability that local nuclear conflicts will have high political content during the phases in which there might be hope of control or rapid termination will make it desirable for the U.S. to be able rapidly to assess collateral damage.

Defense planners may find it useful to tailor C3I technology to cope with SNFs:

- Means to track delivery systems: Since most SNF strikes would not involve exoatmospheric launch profiles, other technical means would be necessary to ascertain preparation for a nuclear strike, or to track the origin and probable destination of strike systems. It could be useful, for example, to sponsor an appropriately classified study of what an SR-17 payload dedicated to a regional nuclear conflict might look like.

- Rapid "fingerprinting": A regional flythrough capacity with near real time diagnostics could enable the U.S. to resolve ambiguities about the likely source and technology of a nuclear weapon.

- o C^3I "fallback": C^3I sensor attrition due to such nuclear effects as EMP, TREE and ionospheric would pose the need for rapid replacement.5/ Mini-AWACs and suitably-equipped tactical aircraft (e.g., F-15 or F-18) might fill this role. Consideration could be given to a hardened tactical airborne command post for the 1990s, to be used on a global basis to supplement C3I capabilities for nuclear war.

- o Rogue weapon "Skyhook": The potential need to rapidly locate a potential nuclear device in spite of its low emission of radiation would make improvements in detection capability and technology that could remotely disarm or disable a nuclear device highly useful.

2) Improved Software for Regional Nuclear War Planning6/

The U.S. needs to extend its planning for nuclear war to cover this region and to cover a full range of force sizing scenarios (see Appendix D):

- o Strike option planning: Detailed plans will be needed to determine how the U.S. can best use programmed forces to:
  - conduct preventive strikes against SNFs in development;
  - suppress SNFs with minimum collateral damage;
  - extend deterrence to cover areas of vital importance;

- o Deterrent Planning Priorities: The need to preclude Soviet miscalculation, escalation and counterstrikes poses requirements for sophisticated data collection, data exchange and communication links, and plans for suitable exercises, C3I tests, demonstrative deployments and other signals, to establish crisis or conflict boundaries, and "rules" for crisis-management.

3) Investments in Appropriate Deployment Capability

While U.S. regional force planning already takes account of many elements of mobility, firepower, airborne C3I, prepositioning, base diversification and lift that offer the flexibility and survivability which would also be needed for limited nuclear conflict, certain additional considerations may be useful:7/

- o Air Basing: plans for additional dispersal of C^3I air support equipment at civilian airports and highway construction for possible runway dispersal away from major urban facilities and dedicated bases;

- o Sea Basing and Sealift: plans to improve the sophistication, capacity and response time of sea based prepositioning and sealift, increases in range and firepower of carrier-based aircraft, and convertibility of supertankers into light carriers with attack helicopters (Arapaho concept).8/

Improvements in Passive Defense

1) The Oil Problem: the producer countries could be encouraged to pursue plans for the dispersal of new oil facilities, and be given technical assistance in planning redundancy and reduced vulnerability in the structure of those facilities.

2) Utilities, Water, and Key Civil Facilities: the states of the region could be encouraged to avoid ultra-large water and utility plants, a benefit not only to defense but often also to rational economic development.

3) Basing and Military Facilities: the states of the region could be encouraged to improve passive defense and repair capabilities at bases, and to disperse rather than co-locate their military facilities.

4) Civil Defense: a low level U.S. research effort could be started into the special problems of civil defense in th Middle East, Gulf, and South Asia, and into what types of rescue activities would be possible.

Incremental Priorities for U.S. Force Planning9/

Costly near term changes in U.S. force planning probably are not called for by the SNF threat, but marginal tradeoffs and incremental investments for SNF purposes could have high payoffs in certain areas:

1) Contingency Planning

Analysis of a range of SNF contingencies to determine what kinds of policy alternatives might be available and to stimulate the formulation of policy guidance would be highly useful and would make it feasible for military planners to designate force reallocation within available or planned resources for the most probable contingencies.

2) Improved Dual Capability:

Despite its present deficiencies, the Patriot system has potential regional tactical capability, and offers a basis for standardizing host facility and U.S. regional air defense against conventional as well as SNF threats. Similarly, the F-5G, F-16C, F-15E and F-18 could be made more proficient for SNF environment missions with appropriate avionic package improvements, at relatively modest cost.

3) Increased Strike and Lift Range:

Conversion of the B-52B to theater and naval missions is a useful step. Attention also should be given to the range/payload advantages of the F-14, F-15E and F-18, and to extending the range of the F-16C to improve dispersability, loiter time, and capacity to deliver advanced conventional submunitions. Expanding the air tanker force could have high payoffs for a regional conflict.

4) Nuclear Training, Doctrine and Equipment:

Though providing regional force elements with effective nuclear training, doctrine and protection may take until 1995, an effort to find interim solutions and compromises is in order. Experimental adaptation to dispersed or tactical nuclear posture, with C3I procedures, for desert and mountain warfare conditions could lay essential ground work for more intensive future efforts.

5) Regional Nuclear Strike Forces:

Programmed U.S. assets theoretically could support regional nuclear operations, but the needs still exist to weld these assets into an effective force for extended deterrence and actual strike operations, to integrate future options like ALCM and SLCM, and to determine how mission needs best can be met without forward nuclear basing.

6) Dedicated Special Forces:

Caution is advisable in considering special military teams for SNF scenarios. Special weapons search and deactivation teams may have value, but these are different in character. If preventive strike options are called for, these could be mounted by special forces and covert action teams with generic rather than dedicated anti-SNF mission capabilities.

Arms Control Considerations

New arms control considerations may arise because of regional SNF capabilities in several areas: (1) strategic arms control; (2) crisis management; (3) conventional arms transfer (CAT) limitation; (4) military or dual-capable high technology transfer controls; (5) technical measures to stabilize SNFs; and (6) augmented nonproliferation measures, e.g., nuclear-free zones.

1) Strategic Arms Control:

SNF scenarios could place additional stress on existing limits or planned reductions of strategic nuclear systems and verification measures in the SALT/START and MBFR/INF negotiating fora. Soviet strategic and theater force responses to SNF developments could place new demands on U.S. counterpart force planning requirements.

2) SNF Crisis Management:

Crises may arise over the imminent emergence of SNFs as well as over future regional conflicts where SNFs are used or might be used. New or upgraded channels of superpower consultation and communication probably will evolve. These could offer some degree of reciprocity or parallelism of posture concerning preventive actions against incipient SNFs, restraint against proxy exploitation of SNFs, and insulation or decoupling of SNF actions from superpower confrontational contingencies.

3) CAT Limitations:

U.S. defense planners may need to scrutinize CAT and security assistance more carefully to assess the tradeoffs between local inter-operability with U.S. forces and local nuclear disincentives (the benefits of CAT) on one hand and the potential resulting threats to U.S. forces from more locally abundant, sophisticated and potentially nuclear-capable systems (the pitfalls of CAT)10/ on the other.

4) High Technology Transfer Controls:

Many potential dual use technologies (e.g., missile frames, engines, auto-guidance, and sensors) are becoming commercially available, with serious implications for advanced SNF proliferation. Further research on these implications and possible countermeasures should be encouraged and evaluated by defense planners for long term requirements.

5) Technical Measures to Stabilize SNFs:

Once SNF proliferation has occurred, some technical cooperation may become advisable to ensure that local physical security and controls against unauthorized use are made effective, to discourage deployment or use plans that might invite nuclear preemption by a neighbor, to strengthen barriers to inter-state transfer of nuclear weapons, and possibly to assist with local bilateral tension-reduction or confidence-building procedures.

Adoption of any such measures may be highly selective and occur only after thorough consideration of how to preclude or minimize undesired effects, e.g., the legitimization of an SNF, perceptions of SNF proxy implications, and the like. It should be kept in mind, moreover, that local decisionmaker anxiety about nuclear weapon safety and control are useful deterrents to proliferation that careless assistance may obviate.

6) Augmented Nonproliferation Measures:

Augmented nonproliferation efforts such as nuclear-free zones (NFZ) may impact on defense planning, especially on range and rapid lift requirements for nuclear weapons, which may have to be stored outside the NFZ and a possible theater of operations, but also on

declaratory policy for nuclear employment (e.g., no nuclear first-use, or no nuclear use under specified conditions). These requirements would also have restrictive implications for extended deterrence in the region but possibly positive implications for crisis management, e.g., by raising nuclear thresholds and closing certain avenues of escalation between the superpowers.

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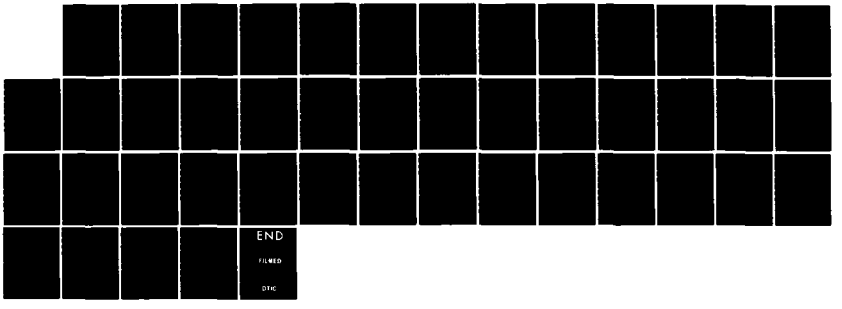

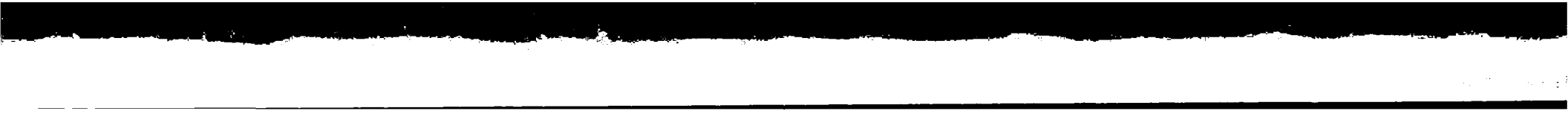

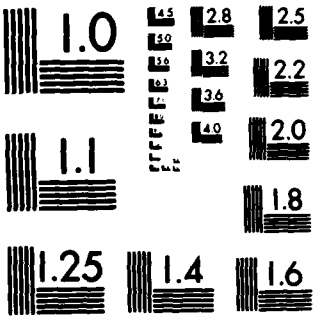

MICROCOPY RESOLUTION TEST CHART
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20. This represents the judgment of Robert Hunter, consultant to the Project. Feldman documents this opinion in the Arab press. Feldman, Israeli Nuclear Deterrence, op. cit., pp. 61-62.

21. President Sadat promised in a 1974 interview that "if Israel intends to introduce nuclear weapons into this area, we too will find a way of acquiring such weapons." President Assad of Syria indicated the same with regard to Syria in 1977, and Iraqi President Sadam Hussein called in June 1981 following the Israeli raid on

OSIRAK for "all peace-loving nations of the world to help the Arabs acquire the atomic bomb to balance Israel's nuclear capability." Feldman, Israeli Nuclear Deterrence, op. cit., pp. 69-70.

22. Richard Betts, Henry Rowen, and Richard Brody, "Regional Instabilities," in Joseph A. Yager, ed., Nonproliferation and American Foreign Policy (Washington, D.C.: Brookings Institution, 1980), pp. 191-193.

23. This is illustrated by Egypt's Defense Minister, General Badauis, in a 1980 statement: "The day that Qadaffi obtains a nuclear bomb, we shall also acquire such a weapon, not in order to use it against Libya, but rather in order to deter him from using it against us." Feldman, Israeli Nuclear Deterrence, op. cit., p. 155.

24. Jones, "Southwest Asia," in Taylor & Maaranen, The Future of Conflict, op. cit., pp. 520-580.

25. For an unconventionally optimistic prognosis of the impact of nuclear proliferation on the likelihood of war, see Kenneth N. Waltz, "The Spread of Nuclear Weapons: More May Be Better," Adelphi Paper No. 171 (London: IISS, 1981).

26. It is interesting to note in this regard that Soviet Foreign Minister Andrei Gromyko recently asked the United Nations General Assembly to declare that the destruction of peaceful nuclear facilities by conventional weapons is equivalent to an attack involving the use of nuclear weapons. Nucleonics Week, Oct. 7, 1982, p. 10. See also, Bennet Ramberg, Destruction of Nuclear Energy Facilities in War: The Problem and the Implications (Lexington, Mass.: Lexington Books, 1980) and Nuclear Energy In War: The Implications of Israel's Reactor Strike, ACIS Working Paper No. 34 (Univeristy of California, Los Angeles: Center for International and Strategic Affairs, August, 1982).

27. Based on analysis offered by Anthony Cordesman.

28. Uri Bar-Joseph, op. cit., p. 206.

29. The extensive debate is well-documented in Feldman, Israeli Nuclear Deterrence, op. cit.,; Uri Bar-Joseph, "The Hidden Debate," op.cit.,; Betts, Rowen, and Brody, in Yager, ed., Nonproliferation, op. cit., pp. 226-231; Harkavy, Spectre of a Middle Eastern Holocaust, op. cit.,; and Yehezkel Dror, "Small Powers Nuclear Policy: Research, Methodology, and Exploratory Analysis," Jerusalem Journal of International Relations, I (Fall 1975), pp. 29-49. See also Alan Dowty, "Nuclear Proliferation: The Israeli Case," International Security Studies Quarterly, No. 22, March 1978, pp. 22-23; and Shlomo Aronson, "Nuclearization of the Middle East: A Dovish View," Jerusalem Quarterly, No. 2 (Winter 1977), pp. 27-44.

30. Uri Bar-Joseph, "The Hidden Debate," op.cit., p. 216. See also Barry M. Blechman and Douglas M. Hart, "The Political Utility of Nuclear Weapons," op. cit., p. 137.

31. Uri Bar-Joseph, "The Hidden Debate," op. cit., p. 222.

32. Zalmay Khalilzad, Pakistan: The Nuclear Option, Monograph 10, Final Report no: (49-1)-3747 prepared for Energy Research and Development Administration, (Los Angeles: Pan Heuristics, 1977), pp. 29-38.

33. See Jones, Nuclear Proliferation, op. cit., pp. 25-29 and 33-44.

Chapter Four

Impact of Small Nuclear Forces on U.S. Military Forces and Operations in the Region

1. Information supplied by Stephen Meyer, consultant to the Project. Until the 1970s, U.S. military planners assumed that a major war with China would involve the Soviet Union as well. EMP hardening of certain U.S. tactical aircraft was undertaken as a precaution.

2. Idem.

3. As Henry Kissinger notes, the airlift to restrict Israeli weapons inventories required that "American planes from Germany had to fly out over the Atlantic, skirt France and Spain, enter the Mediterranean at Gibralter, and fly directly to Israel -- a detour of 2,000 miles." Henry Kissinger, Years of Upheaval (Boston: Little, Brown, and Co., 1982), p. 709.

4. Moreover, the U.S. has refused to give nuclear retaliatory pledges on a blanket basis.

5. For example, the injection of a MAJOR ground force package would consume the entire lift capacity of the C-5A and C-141 fleets for several weeks. Sustaining the force might require 380 tonnes of supplies per day or; alternatively, 18 deployed C-5A aircraft. Information supplied by Stephen Meyer.

6. Idem.

7. For an account of the climate of perceptions in India of the 1971 Enterprise task force, see Pran Chopra, India's Second Liberation, (Delhi: Vikas Publishing House, 1973), pp. 197-213.

8. Based on the Biliun Baker test of July 1946. Information supplied by Stephen Meyer.

9. See Samuel Glasstone and Phillip J. Dolan, The Effects of Nuclear Weapons, prepared and published by the U.S. Department of Defense and the U.S. Department of Energy, 1977; and The Effects of

Nuclear War, Office of Technology Assessment (Washington, D.C.: Congress of the U.S., 1979).

10. Information supplied by Stephen Meyer.

11. Idem.

12. Idem.

13. The following discussion is based on information supplied by Stephen Meyer.

14. Though a single British VULCAN bomber was used in the Falklands Islands War against the single runway near Stanley, post-war intelligence revealed that Argentina continued to use the airfield. Joshua Epstein argues that at least 50 bombing sorties per runway are necessary to ensure severe crippling. Joshua Epstein, Political Impediments to Military Effectiveness (Cambridge, Mass.: MIT, 1980). This would require at least a half dozen tactical fighter-bombers per runway, assuming that each plane has four 1,000 kg hard points carrying two bombs per hard point. Information supplied by Stephen Meyer.

15. See Jeffrey Record, The Rapid Deployment Force and U.S. Military Intervention in the Persian Gulf (Washington, D.C.: Institute for Foreign Policy Analysis, 1981), passim.

16. Uri Bar-Joseph, "The Hidden Debate: The Formation of Nuclear Doctrines in the Middle East," The Journal of Strategic Studies (Vol. 5, No. 2, June 1982), p. 216.

17. Stephen R. Grumman, The Iran-Iraq War, Washington Paper No. 92 (Washington, D.C.: Center for Strategic and International Studies of Georgetown University, 1982).

Chapter Five

Western Alliance Issues and Responses

1. The following discussion concentrates on the European members of the North Atlantic Alliance. It omits the East Asian allies, which historically have had little or no military role in the Middle East or South Asia. It should be added, however, that East Asian linkages with this region may become substantially greater in the future, and eventually could have an important bearing on how SNF-induced instability or SNF threats are addressed over the long term. Much of the discussion is based on information supplied by Kenneth Myers, the Director of European Studies at CSIS. See also, James R. Golden, NATO Burden-Sharing: Risks and Opportunities, Washington Paper No. 96 (Center for Strategic and International Studies of Georgetown University, 1983).

2. Melvin Conant, "Resources and Conflict: Oil -- The Likely Contingencies," Third World Conflict and International Security, Part II, Adelphi Paper, No. 167 (London: IISS, Summer, 1981), pp. 45-50; Herman T. Franssen, "World Economic and Energy Trends: Implications for Energy Security," unpublished manuscript (mimeo) prepared for Conference on the Future of Nuclear Power, Bonn, West Germany, December 1981, co-sponsored by the Institute of Foreign Policy Analysis, Cambridge, Mass.; "Defending the Gulf: A Survey," The Economist, June 6, 1981, pp. 1-38. There are some who are skeptical this is any longer feasible; see for instance, Walter J. Levy, "Oil and the Decline of the West," Foreign Affairs, Summer 1980, pp. 999-1015.

3. William Sweet, "Europe's Postwar Generations," 1981, Congressional Quarterly, Vol. II, No. 23, December 18, 1981, pp. 435-957.

Chapter Six

Issues of Soviet Perception and Response

1. This reflects the judgment of Tyrus W. Cobb, consultant to the Project.

2. The analysis of the Soviet Union's non-proliferation policy is based on information supplied by Tyrus Cobb. See also Gloria Duffy, Soviet Nuclear Energy: Domestic and International Policies, prepared for the U.S. Department of Energy, contract No. R-2362-DOE (Santa Monica, CA.: Rand, December 1979). Soviet policy on nuclear weapons capabilities in China are discussed in Arnold Kramish, "The Great Chinese Bomb Puzzle -- and a Solution," Fortune, Vol. 63, No. 6 (June, 1966), pp 157-158, 246-248, 250. See also Jonathan D. Pollack, "China as a Nuclear Power," in William Overholt (ed.), Asia's Nuclear Future (Boulder, Colorado: Westview Press, 1977).

3. For thorough discussions of Soviet concern about the FRG, see Benjamin Lambeth, "Nuclear Proliferation and Soviet Arms Control Policy," Orbis, Summer 1975, p. 296, and "Control of Nuclear Proliferation," in John Barton and Lawrence Weiler (eds.), International Arms Control: Issues and Agreements, (Stanford, Ca.: Stanford Univeristy Press, 1976). For Soviet policy on the NPT negotiations, see George Quester, The Politics of Nuclear Proliferation (Baltimore, Md.: Johns Hopkins University Press, 1973).

4. Duffy, Soviet Nuclear Energy, op. cit., pp. 84-86.

5. Information supplied by Tyrus W. Cobb. The safeguards agreement covering Soviet Heavy Water Sale to India in 1977 can be found in Duffy, Soviet Nuclear Energy, op. cit., beginning p. 108.

6. This reflects the judgments of Stephen Meyer and Tyrus W. Cobb, consultants to the Project.

7. See Duffy, Soviet, op. cit., pp. 29-82.

8. The Soviet Union has offered assistance to India in building a 1,000 Mw nuclear power plant. But the details of the offer have been slow to be worked out, and India has expressed mixed interest in the offer, noting that the reactors involve different technology than India's expanding heavy water-based program and the possibility of stringent Soviet safeguards. Nucleonics Week, Vol. 23, No. 39, Sept. 30, 1982, p. 10.

9. Information supplied by Tyrus Cobb.

10. Following the signing of a Treaty of Friendship and Cooperation with the USSR, Syria claimed that the Soviets had agreed to provide nuclear protection -- and even provide them with nuclear weapons -- if attacked by a nuclear power. Regardless of the truth of the observation, what is important is what the Syrian leadership believes. Information supplied by Stephen Meyer.

11. Casper W. Weinberger, Soviet Military Power (Washington, D.C.: U.S. Department of Defense, 1981).

12. PRC tactical nuclear weapons capabilities are a matter of some controversy. Strategic forces include 4 T-5 ICBMs with 13,000 km ranges and 5 MT warheads, 10 T-3 IRBMs with 4,800-5,600 km ranges and 2-3 MT warheads, 50 T-1 MRBMs with 1,100 km ranges and 20 KT warheads, 90 B-6 medium bombers, and 1 G-Class SSBN with three experimental missiles. IISS, Military Balance, 1982-83, p. 80.

13. Information supplied by Stephen Meyer.

14. The Soviet Navy's dependence on land-based air support has been another constraint upon its power projection capabilities. This should remain throughout the 1980s and most of the 1990s. Currently the sea-based air support for the Soviet Navy is provided by Moskva and 2 Kiev vertical/short take-off and landing carriers. There are 2 Moskva and 2 Kiev class ships, with 2 more Kievs under construction, now in the Soviet inventory. Both of these ships are primarily antisubmarine warfare vessels and cannot provide the types of air support required for modern warfare at sea. However, the Soviets are in the process of constructing an air superiority carrier. If the Soviets have no major construction problems with their new carrier and given current construction rates and yard capacity, by 1995 the Soviets could have 7-8 air-capable ships: 2 Moskva, 4 Kiev, and 1-2 large aircraft carriers. A new carrier could enter the Soviet navy every six years. If the Soviets decide not to go into full development of this new carrier, it has been estimated that a total of 13 Kievs could be in the Soviet inventory by the year 2000. These ships will give Moscow added capabilities but the major constraints on Soviet power projection capabilities will continue to exist. Information supplied by Tyrus Cobb.

Chapter Seven

Defense Planning and Policy Implications

1. For recent discussions of these constraints, which will grow sharply with the Democratic increase in the House, see Aviation Week, November 8, 1982, p. 22; and the Armed Forces Journal, September 1982, pp. 12-17; and November 1982, pp. 8-13.

2. This judgment was frequently expressed by various conference participants.

3. Although the defense program is in considerable flux, the FY 1983 Report of the Secretary of Defense, DOD, Washington, 1982, Vol. III, pp. 101 - 111, remains the best unclassified summary of current U.S. plans. The Near-Term Prepositioning Ships/Expanded Near-Term Prepositioning Ships program and acquisition of four SL-7 fast deployment logistic ships is particularly important. Information supplied by Anthony Cordesman, consultant to the Project.

4. See footnote 7, chapter 3, supra.

5. The nuclear effects on C3I are detailed in Desmond Ball, "Can Nuclear War Be Controlled?," Adelphi Paper No. 169, (London: IISS, 1981). See also Congressional Budget Office, Strategic Command, Conrol, and Communications: Alternative Approaches to Modernization (Washington, D.C.: 1981).

6. The following discussion is based on information supplied by Anthony Cordesman.

7. See note 3, supra.

8. The last point reflects the judgment of Anthony Cordesman. Reducing a carrier from 76,000-90,000 tons to 46,000 tons still produces a target with an 800 foot deck that can easily be tracked and targetted by existing Soviet satellites of the kind used to feed Argentina information during the Falklands conflict. At the same time, the number of combat aircraft is reduced from 96 to 38. It would take two medium carriers to field 76 aircraft vs. 96 on one heavy carrier and the basing cost per aircraft would be $245 million for the small carrier vs. $121 million for the large carrier. Armed Forces Journal, September 1982, p. 44.

9. The following section is based on information supplied by Anthony Cordesman.

10. The political aspects of conventional arms transfers are discussed in Andrew J. Pierre, The Global Politics of Arms Sales (Princeton, New Jersey: Princeton University Press, 1982).

11. For a discussion of the Latin American Nuclear Free Zone,

see John R. Redick, "The Tlatelolco Regime and Nonproliferation in Latin America," in George H. Quester, ed., Nuclear Proliferation: Breaking the Chain (Madison, Wisconsin: University of Wisconsin Press, 1981), pp. 103-134.

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APPENDIX A

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APPENDIX B

PLUTONIUM AND URANIUM SOURCES FOR NUCLEAR WEAPONS

The Plutonium Route

The amount of separated plutonium that can be stockpiled by a country from its own facilities is limited both by the production capacity of nuclear reactors and the capacity of reprocessing facilities for spent fuel.1/ Operational constraints usually will further limit the potential accumulation. Shutting down reactors or reprocessing plants for refueling, repairs or contamination, for example, will restrict plutonium production capacity.

1) International Safeguards:2/

International Atomic Energy Agency (IAEA) safeguards may represent additional constraints, to the extent that they are applied. Those states which are parties to the NPT are obligated to accept "fullscope" safeguards, i.e., IAEA safeguards on all nuclear activities, materials, and facilities in that national jurisdiction. The near-term proliferation candidates in this region, Israel, India and Pakistan, are not NPT parties. India and Pakistan have accepted IAEA safeguards selectively, but not on all facilities. Israel thus far rejects IAEA safegards on its Dimona facilities and allows IAEA inspection only of a single small research reactor. Most of the other regional states of concern are NPT parties and subject to fullscope safeguards.3/

Strictly speaking, IAEA safeguards do not prohibit plutonium separation (or uranium enrichment), but merely verify that fissile material is not diverted from peaceful purposes. But this verification represents an important legal barrier against the use of safeguarded fissile material for nuclear weapons purposes. In the IAEA's view, the use of safeguarded material in any nuclear explosive would be a violation of IAEA safeguards whether the state in question is a NPT party or not.

A party to the NPT may withdraw legally from the Treaty three months after serving appropriate notice. A state could also abrogate safeguards, or violate them by diverting safeguarded material. Such actions would not be adopted lightly, but cannot be completely discounted. Fully safeguarded NPT states, if they decide to develop nuclear weapons, probably will at some point withdraw from the NPT, though they almost certainly would attempt to develop the requisite fissile materials production base prior to that step. States that are not subject to fullscope safeguards but develop nuclear weapons probably will try to avoid the use of safeguarded material.

2) Power Reactor as Weapons Source:4/

Plutonium generated by nuclear power reactors conceivably may be used for nuclear weapons purposes, but this is unlikely to be a preferred source. It might be resorted to where no satisfactory alternatives exist. The reason is that fuel consumed in efficient electricity production (i.e., high burn-up fuel) tends to contain greater admixtures of other plutonium isotopes along with Pu-239, and such isotopically mixed plutonium increases the difficulty of nuclear weapons design -- a significant problem for any new weapons program. The least satisfactory plutonium for nuclear weapons purposes would be that derived from high burn-up spent fuel from light water reactors (LWRs). Plutonium from heavy-water-moderated reactor (HWR) high burn-up spent fuel would be somewhat more attractive, though not optimal. But an added caution in the case of HWR power reactors should be mentioned, since their design usually allows routine fuel element substitution while in operation, so that "weapons-grade" plutonium could be produced without interrupting electricity production.

3) Production Reactor as Weapons Source:

For weapons purposes, the most readily usable plutonium is from "production" reactors in which controlled burn-up time and frequent refuelling permit the accumulation of relatively pure PU-239. (The volume of spent fuel that results, of course, increases the capacity requirement of any adjunct reprocessing facility.) Theoretically, any power reactor could be used as a production reactor. Many experts believe, however, that a state intent on nuclear weapons acquisition is more likely to acquire or build reactors dedicated to weapons-grade plutonium production than to use power reactors for the purpose.5/

4) Research Reactor as Weapons Source:

Though typically smaller than power reactors, large-scale research reactors can provide incrementally significant plutonium stockpiles and could be selected as dedicated reactors. In the past, as in the case of Israel and India, fairly large research reactors were sometimes supplied free of IAEA safeguards. Normally today, large research reactors are sold subject to safeguards, the French sale of OSIRAK to Iraq being a case in point. The Israeli (DIMONA) and Indian (CIRUS) research reactors are natural uranium-fueled, heavy water-moderated types, and can be calibrated to produce weapons-grade plutonium. The plutonium for India's nuclear detonation in 1974 was derived from CIRUS. India is currently completing construction of a scaled-up, indigenous version of CIRUS designated R-5. The French-supplied, HEU-fueled, light water OSIRAK reactor would produce in that configuration relatively little plutonium, but if operated with a blanket of natural uranium around the core, it could produce weapons-grade plutonium.6/

Most states in the region would not be in a position today to independently build a power reactor or even a large-scale HWR research reactor like India's R-5. But a much simpler alternative exists. Almost any state with a modest scientific and engineering establishment today could build its own natural uranium-fueled, graphite-moderated, air-cooled reactor from published design information and commercially available materials.7/ The probable cost of such a reactor capable of providing sufficient plutonium for one or two weapons a year could be well under $100 million, and the construction time might be as little as four years. The plutonium from a graphite-moderated reactor could be of very high quality for weapons. Since such a reactor could be built independently and natural uranium is widely available, the reactor could be kept free of safeguards and readily be dedicated to weapons purposes.

Spent fuel reprocessing facilities would be needed for plutonium separation. India began reprocessing in an unsafeguarded pilot scale plant about 1965, has since built a larger facility, and has one or more others in construction or planning.8/ Israel is believed to have developed reprocessing covertly in the early 1960s,9/ and Pakistan is reported to be currently developing unsafeguarded reprocessing technology.10/ Laboratory-scale facilities ("hot cells") which could be converted to reprocessing have been promised to Iraq by European suppliers. Plans in pre-revolutionary Iran called for the development of reprocessing. But it is clear that reprocessing facilities, like graphite reactors, can be built indigenously and free of safeguards from published information and commercially available materials by any state endowed with a modest scientific and engineering establishment.11/ The cost would not need to be more than a few tens of millions of dollars, and the job could be accomplished in about five years.

The Uranium Enrichment Route12/

Enriched uranium heretofore has been strictly controlled and subjected to safeguards by a relatively small number of suppliers, and the production technology has been even more tightly held. Enrichment technology has a much higher initial cost and is much more difficult to develop and operate successfully than reprocessing technology. This was particularly true of enrichment by gaseous diffusion, the technology used by the original nuclear weapons powers. Thus, uranium enrichment is a much less attractive route for proliferation candidates which are beginning nuclear programs or have limited scientific and engineering personnel and industrial infrastructure. The development in the West of gas-centrifuge enrichment technology, 13/ however, has lowered technical barriers somewhat.

By various subterfuges, Pakistan, for example, got access to URENCO designs and component suppliers and has used these in efforts to establish both pilot-scale and commercial prototype gas-centrifuge facilities free of safeguards, and may ultimately succeed in operating them.14/ India is known to have at least a research program in centrifuge enrichment.15/ Speculation exists that Israel

may have developed a secret facility for enrichment of uranium.16/ Pre-revolutionary Iran invested in a European enrichment consortium (EURODIF); while this did not give Iran the technology directly, it probably offered some prospect of technical training for Iranians. Such access has not been available in the wake of the revolution, but might be revived eventually.

Laser isotope-separation (LIS) technology currently under development17/ could virtually eliminate technical barriers to enrichment once it is available, possibly by the mid-1990s. LIS conceivably could be relatively inexpensive and kept clandestine more easily than forerunner enrichment technologies.

The attractiveness of independent enrichment capabilities for a state which wishes to acquire nuclear weapons is straight-forward. Nuclear explosive devices using highly-enriched uranium (HEU) are simpler in concept to design and confidence in explosive yield usually is easier to establish, even short of nuclear explosive testing.18/ HEU is also somewhat less hazardous to handle than plutonium. Moreover, it is widely believed that states which intend to proceed with advanced or thermonuclear weapons would require HEU.

In an unclassified context, it is impossible to quantify with any precision the potential rate of nuclear weapons production from indigenously developed uranium enrichment facilities. What can be said with some certainty is that successful production of HEU virtually guarantees a nuclear explosives "capability" to the possessor.

Fissile Material and Potential Warheads

Various "critical mass" numbers of plutonium and HEU explosive cores can be found in the published literature. La Marsh, in an article on the proliferation potential of graphite-moderated reactors, uses the figure of 4 kilograms of plutonium and 11 kilograms of HEU, presumably assuming very high grade material.19/ The 1968 United Nations study values are roughly double, 8 kilograms of plutonium and 25 kilograms of HEU.20/ The data in Table 1 (see chapter 1 of the report) adopts the lower plutonium figure (4 kg.) for "production" reactors -- including research reactors that could serve as dedicated facilities -- and the higher plutonium figure (8 kg.) for power reactors.

The HEU figure is not immediately pertinent here. Though very little is known about the specific capacity of Pakistan's enrichment program, press reports indicate that the larger facility under construction is expected to be capable of producing about 5 or 6 bomb quantities of material a year.21/ This information has been incorporated in Table 1 (of chapter 1), with a guess that the facility might become operational in 1985.

Plutonium Production Parameters

Background information supplied by Arnold Kramish provided the

following parameters used in report calculations:

1) A natural uranium-fueled, heavy water-moderated reactor would produce weapons-grade plutonium when the fuel is irradiated for about 1000 megawatt days per ton of the uranium loading. A ton of such irradiated uranium would contain about one kilogram of weapons-grade plutonium. The annual quantity of plutonium produced by a reactor in this dedicated mode can be estimated from its thermal capacity: the conversion factor would be about one-third of a kilogram of plutonium per megawatt of thermal capacity.

2) A non-dedicated natural uranium reactor (such as Pakistan's KANUPP or India's RAPP power reactors) requires a different conversion factor since the reactor rating is usually expressed as electrical capacity. The thermal capacity is roughly three times the electrical capacity. For every megawatt of electrical capacity, such a reactor will produce about one kilogram of plutonium per ton of fuel. A 200 megawatt electrical reactor with about 200 tons of uranium throughout, for instance, would produce about 200 kg. of plutonium, in the course of a year. Those numbers happen to correspond roughly to the size and operation of each of India's two Rajasthan power reactors.

3) A reactor fueled with slightly enriched uranium will produce about half the plutonium quantity that a natural uranium reactor of equivalent power would produce, or about half a kilogram per megawatt of electrical rating each year.

Table B. 1

NATIONAL NUCLEAR WARHEAD POTENTIAL
(critical masses of fissile material theoretically available)

	1982		1990		2000	
	APR*	TOTAL	APR	TOTAL	APR	TOTAL
INDIA**						
1) Research Reactors (unsafeguarded						
CIRUS 40 MWth (1964)	3	57	3	81	3	111
R-5 100 MWth (1983)	-	-	8	24	8	104
2) Power Reactors (safeguarded)						
RAPP I 200 MWe (1976)	25	175	25	375	25	625
RAPP II 200 MWe (1981)	25	25	25	225	25	500
3) Power Reactors*** (unsafeguarded)						
MAPP I,II 470 MWe (1986)	-	-	58	290	58	870
NAPP I,II 470 MWe (1991)	-	-	-	-	58	522
Total of 1,3 (unsafeguarded)	3	57	69	395	127	1,607
PAKISTAN						
1) Power Reactors (safeguarded)						
KANUPP 125 MWe (1971)	15	150	15	270	15	420
CHASMA 900 MWe (1990)	-	-	-	-	56	560
2) Enrichment Facility (1985) (unsafeguarded)			6	30	6	90
Total of 2 (unsafeguarded)	0	0	6	30	6	90
ISRAEL						
1) Research Reactor (unsafeguarded)						
DIMONA 26 MWth (1964)	2	16				
DIMONA 70 MWth (1980)	5.5	11	5.5	71	5.5	126
2) Enrichment Facility (?)	?	?	?	?	?	?
Total	2+	27	5.5	71	5.5	126
IRAQ						
1) Research Reactor (safeguarded)						
TAMMIZ II 70 MWth (1990)	-	-	5.5	5.5	5.5	60

* Notes to Table on following page.

Table B.1 footnotes

* APR = Annual Production Rate.

** India's technical potential for diversion from safeguarded stocks is understated by omitting Tarapur spent fuel stocks from the table. But in our judgment, there are compelling political considerations that would deter such a step, given India's other technical options. It is also true that Tarapur LWR spent fuel is intrinsically unattractive for weapons purposes.

Even if India resorted to safeguarded stocks from Rajasthan (RAPP) the 100 ton annual capacity limitation of the Tarapur reprocessing plant would limit plutonium accumulation to about 100 kg. a year for at least the next few years. Resort to safeguarded stocks would have very little appeal when R-5 production is available, and it may be so now. The controversy over Tarapur has obscured the possible role of R-5 as a dedicated production reactor.

*** Delays in India's power plant installations make any predictions of operational starts unreliable. The indicated dates in this case are guesses, but extremely conservative. The construction of the unsafeguarded Madras power plant (MAPP), for example, is reportedly complete, and possibly could come on line long before 1986. Plans for the Narora power plant (NAPP), also unsafeguarded, imply an earlier timetable. Earlier starting dates, of course, would make India's unsafeguarded production capability that much more impressive.

NOTES TO APPENDIX B

1. For general background, see CRS, Nuclear Proliferati Factbook, op. cit.; and OTA, Nuclear Proliferation and Safeguard op. cit.; SIPRI, Nuclear Energy and Nuclear Weapon Proliferation, o cit., especially chp. 1, 3-4. For a more detailed technical a international policy treatment, see Gene I. Rochlin, Plutoniu Power, and Politics: International Arrangements for the Dispositi of Spent Nuclear Fuel (Berkeley and Los Angeles: University California Press, 1979).

2. A readable and comprehensive discussion of the evolution IAEA nuclear sageguards may be found in OTA, Nuclear Proliferati and Safeguards, op. cit. See also SIPRI, Nuclear Energy and Nucle Weapon Proliferation, op. cit., chp. 8.

3. For a review, inter alia, of the NPT and safeguards stat of countries in this region, see Richard K. Betts, "India, Pakista and Iran," and Henry S. Rowen and Richard Brody, "The Middle East in Joseph A. Yager, ed., Nonproliferation and U.S. Foreign Polic op. cit., particularly chps. 5 and 10.

4. See OTA, Nuclear Proliferation and Safeguards, op. cit chp. VII.

5. John R. La Marsh, "On the Construction of Plutoniu Producing Reactors by Small and/or Developing Nations," in CR Nuclear Proliferation Factbook, op. cit., pp. 533-562.

6. Israeli Attack on Iraqi Nuclear Facilities, Hearings, cit.; Shai Feldman, "The Raid on OSIRAK," op. cit.

7. La Marsh, op. cit.

8. Maddox, "Prospects for Nuclear Proliferation," op. cit Rodney W. Jones, Nuclear Proliferation, op. cit.; A. Wohlstetter, "T Buddha Smiles, op. cit.

9. "Report of the Group of Experts," Israeli Nuclear Armamen op. cit.

10. Milton Benjamin, "India Said to Eye Raid on Pakistani Plant," Washington Post, December 20, 1982, p. A11.

11. John R. La Marsh, "On the Extraction of Plutonium fr Reactor Fuel by Small and/or Developing Nations," Nucle Proliferation Factbook, pp. 563-585.

12. OTA, Nuclear Weapons and Safeguards, op. cit., chp. VI SIPRI, Nuclear Energy and Nuclear Weapon Proliferation, chp. 2.

13. D. Olander, "The Gas Centrifuge," Scientific American, August 1978, pp. 37-43.

14. Jones, Nuclear Proliferation, op. cit., pp. 30-32.

15. Government of India, Annual Report of the Department of Atomic Energy, 1974-75, Bombay, 1975, p. 104.

16. "Report of the Group of Experts," Israeli Nuclear Armament, op. cit., p. 20.

17. SIPRI, Nuclear Energy and Nuclear Weapon Proliferation, op. cit., chp. 2, paper 4.

18. OTA, Nuclear Weapons and Safeguards, op. cit., chp. VI.

19. La Marsh, "On the Construction of Plutonium-Producing Reactors," op. cit., p. 536. See also Gene I. Rochlin, "The Development and Deployment of Nuclear Weapons Systems in a Proliferating World," in John Kerry King, ed., International Political Effects of the Spread of Nuclear Weapons (Washington, D.C.: GPO, 1979), pp. 6-11.

20. Effects of the Possible Use of Nuclear Weapons and the Security and Economic Implications for States of the Acquisition and Further Development of These Weapons, (Report of the Secretary General, United Nations, New York, 1968.)

21. FBIS, Federal Republic of Germany, VII, May 11, 1979, cited in Jones, Nuclear Proliferation, op. cit., page 84, note 19.

APPENDIX C

Illustrative Estimate of Advanced Nuclear-Capable Delivery Systems Likely to be Deployed in the Middle East and South Asia

Country and Date	Weapons System	Numbers	Range with 1,000 kg. Payload (KM, Radius for Acft.)
Algeria (306/132) **			
1982	Mig-23BM	40	390-720*
	SU-20	12	600
	Mig-25A	18	1,100
1990	Mig-27I	50?	500-1,100*
	Mig-23I	50?	500-1,100*
	SU-24	50?	322-1,800*
	SS-21	?	
	SS-22	?	350
	SS-23	?	1,000
Egypt (429/232)			
1982	TU-16	14	4,800
	F-4E	35	750
	Mirage 5	40	600
	F-16A	10	900
	Frog 7	12	15
	Scud B	12	160-280
1990	F-16A/C	150+	900+
	Mirage 2000	50+	460-1,480*
	Sagr "X" SSM	?	600+
	E-2C	?	NA
India (635/227)			
1982	Mig-23BN/UM	10	390-720*
	Jaguar GR-1	16	720
	SU-7MkBM	45	175-320*
	Canberra B(I)-58	45	1,100
1990	Mirage 2000	150	460-1,480*
	Jaguar (Imp)	100	1,000+
	Mig-23BN/.UM	72	390-720
	SS-23 SSM	?	1,000

Iran (217?/130?)			
1982	P-3f Orion MPA	2	1,500
	F-4D/F	30-70	750
1990	?	?	?
Iraq (330/115)			
1982	Mig-23BM	75	390-720
	SU-20	80	600
	Mirage F-1	36	750
	TU-22	9	3,100
	Frog	19	15
	Scud B	9	160-280
1990	Mig-23I	100	500-1,100*
	Mig-27	80+	390-720
	Mirage F-1	72	750
	Mirage 2000I	100+	460-1,480*
	SS-22	?	350
	SS-23	?	1,000
	IL-26/Nimrod (AWACS)	?	NA
Israel (634/NA)			
1982	F-15A/B	40	2,000+
	F-4E	138	750
	F-16A	66	900
	E-2C (AWACS)	4	NA
	E-707 (ECM)	4	NA
	Lance SSM	12	8-120
	Jericho SSM	?	480-600
1990	F-15E/B-Mod	75-150	2,000+
	F-4E/P-110	100	900+
	Lavi	50	350-700*
	F-16C/B Mod/XL	150-250	1,200+
	Jericho II	?	?
	Lance SSM	12	8-120
Libya (555/218)			
1982	TU-22	7	3,100
	Mirage F-1AD	14	750
	SU 20/22	100	600
	Mirage 5D/DE	45	600
	Mig-23BM/U	32	390-720*
	Mig-25U	5	1,100
	Frog 7	48	15
	Scud B	70	160-280

1990	Mid-23I	200	500-1,100
	SU-24	150	322-1,800
	Mig-25U	60	1,100
	Mirage F-1AD	44	600
	SS-22	?	350
	SS-23	?	1,100
	Candid (AWACS)	?	NA
Pakistan (219/62)			
1982	B-57 Canberra	14	1,100
	Mirage 5PA	34	600
1990	F-16B/C	150	1,200+
	E-2C/Nimrod (AWACS)	?	NA
	Chinese SSM	?	600+
Saudi Arabia (128/65)			
1982	NA	NA	NA
1990	F-15E	?	2,000+
	F-15A/B	60	2,000+
	E-3A (AWACS)	5	NA
Syria (450/205)			
1982	Mig-23BM	62	390-720*
	SC-20	40	600
	Mig-21 Bis	100?	400+
	Frog 7	24	15
	Scud B	70	160-280
1990	Mig-23I	150-250	500-1,100
	SU-24	150	322-1,800
	SS-22 SSM	?	350
	SS-23 SSM	?	1,100
	Candid (AWACS)	?	?

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* Radius for Lo-Lo-Lo to Hi-Lo-Hi Missions. Note that radius is more than twice range and that many aircraft can be refueled. Nations with suitable technical capability are assumed to up-engine aircraft by 1990, or improve range with conformal tanks and munitions.

** The figures shown in parenthesis beside each country name are first the total number of combat aircraft operational, and second the portion dedicate to the attack mission.

SOURCE: Numbers for 1982 are taken from the IISS Military Balance for 1982/1983. Only modern attack configured or potential long range strike aircraft are included. Estimates for 1990 include types now on order or logical orders. Table supplied by Anthony Cordesman, consultant to the project.

APPENDIX D

ILLUSTRATIVE FORCE SIZING AND REQUIREMENTS SCENARIOS

The following "force sizing" scenarios were provided by Anthony Cordesman, consultant to the project. They are not intended to be probable, or even to have an assignable probability. Rather they are intended to show the maximum amount of stress that small nuclear forces could put on U.S. forces in the future and to illustrate how the previous trends could involve the United States in significant military action.

Israel-Arab Scenarios

The following scenarios could grow out of the present trends in the Middle East:

1) Peace Keeping Crisis. An Arab-Israeli peace is achieved in the mid-1980s. In order to reduce its defense costs and to ensure its security within something approaching its 1967 boundaries, Israel shifts to reliance on nuclear deterrence to halt a major attack. For internal political reasons, and because of Iraq, Syria continues its massive arms build-up.

To Israel's surprise, political upheavals in Iraq and Syria suddenly transform traditional rivalry into a successful invasion of the Golan. Israel threatens nuclear attack. The U.S.S.R. threatens to retaliate against Israeli delivery sites, knowing an attack on Israel's airbases means the destruction of most of its population.

The United States would be faced with two immediate requirements. First, to be able to rapidly deliver sufficient air power to halt the Syrian-Iraqi invasion without Israel being forced to rely on nuclear weapons, and second, the ability to threaten the U.S.S.R. with limited nuclear strikes (TNOs or RNOs) in order to extend deterrence.

2) Peace Keeping Crisis-No Bases. The same peace keeping crisis might occur under conditions where the United States would be denied any forward base for air operations.

3) Nuclear Device-Real or Unreal. With or without a peace settlement, Israel is confronted with the threat that a nuclear device has been located in the critical area near Tel Aviv where even a crude low yield ground burst or dirty weapon could achieve a long term kill of some 60 percent of the population. Israel is unable to identify a clear source of the weapon and threatens all out retaliation against Arab populations if it is detonated.

The United States would have to: 1) be able to help Israel determine whether a weapon existed, find where it was, and disarm it;

2) be able to use conventional weapons to suppress Israeli nuclear forces in an ultimate emergency; and 3) mount a massive rescue and medical treatment effort with military support.

While many variations on these themes are possible, they all require that the United States be able to extend theater nuclear or strategic deterrence over the region, including against targets in the U.S.S.R. They require excellent local intelligence, backed by every possible technical means, to locate and characterize even one small nuclear device. They require excellent conventional airpower in considerable strength which is either carrier based or which can be supported without dependence on forward bases.

They require the ability to penetrate air defenses which are more ready and technically advanced than those now deployed in the forward areas of the Warsaw Pact, and they require the ability to launch preventive conventional strikes against a small regional force -- in this case that of a close ally whose fundamental strategic interests suddenly and without warning, -- become opposed to those of the U.S.

Interestingly enough, it is virtually impossible to conceive of a scenario where U.S. Army or Marine forces could affect the use of local small nuclear forces except as a potential "hostage" that would deter Soviet or third nation nuclear strikes on a U.S. ally because of its potential coupling effect.

Gulf Force Sizing Scenarios

The problems in the Gulf are somewhat different, since no local power has an immediate ability to acquire nuclear weapons. Nevertheless, both Iran and Iraq may acquire such capabilities by the early 1990s, and it is impossible to rule out a third party purchase or transfer.

1) Civil War or Crisis Transfer. In order to win or dominate an internal civil war, a radical anti-U.S. movement is given nuclear weapon(s) or devices by the U.S.S.R. Such a war might potentially occur after successful U.S. intervention had shifted the conventional fighting in favor of the more pro-Western side.

The United States would be confronted with having to determine the existence of such weapons, and having to locate and kill either the devices or delivery means. Conventional means would be preferable, but limited nuclear strikes might be acceptable. The key elements that would have to exist in U.S. forces would be the ability to detect and confirm transfer, locate the weapon, and destroy it with high confidence and very fast reaction times. Under worst case conditions, the United States would also have to have forces capable of rapid transition to nuclear war on a limited level in the midst of a civil war.

It should be noted that while this case may seem unrealistic, it is a fairly simple problem compared to that of Iran conflict

scenarios in which a U.S. intervention in Iran results in a conflict with the U.S.S.R. and the threat or reality of theater nuclear escalation.

2) U.S. Preventive Strike -- "Irrational Opponent". A violently anti-Western regime arises which threatens every conservative state in the Gulf. Although both the West and Soviet bloc shut off arms deliveries, it "pirates" its reactors and is clearly developing a nuclear device in order to force its political will on the Gulf states. Its possession of advanced F-18 type attack aircraft give it a reasonable chance that one or two aircraft can penetrate the Saudi/GCC air defense system then in place. Israel is not threatened and will no longer risk strikes because of the need to preserve a peace treaty with the Arab states.

The United States must rapidly reinforce friendly air and missile defenses to the extent possible. It must be able to provide extended deterrence against both the threatening country and the U.S.S.R. At the same time, it must recognize that it deals with an irrational enemy and be ready to launch a preventive strike. This would preferably be with conventional means, but the need for a high kill probability would justify nuclear means. Weapons confirmation and location will again require excellent HUMINT and the best technical collection means available.

It is interesting to note that this "improbable" case might well have occurred if the Shah had fallen five to ten years later.

3) Hostile Nuclear Force -- Rational Opponent. A hostile regime emerges in the Gulf area which is anti-Western, but which does not behave sufficiently violently to justify preventive action. The United States is confronted by an immediate risk of nuclear threats or strikes to pressure its allies in the Southern Gulf and the steady build-up of enemy nuclear forces.

The United States would need to act to strengthen friendly air defenses, provide extended deterrence (again in sufficient strength to deny the credibility of Soviet support of such a threatening power). It might have to deploy limited forces forward as a "hostage" to secure extended deterrence, but would need bases or carriers well to the rear. A serious capability to fight a limited nuclear war would be required.

This scenario approximates an Iraq which won an Iran-Iraq War, and which had time to develop a nuclear program without an OSIRAK raid.

4) Actual Use. For whatever combination of irrational or unintended causes, nuclear weapons are actually used in the Gulf against a key friendly oil state, against a smaller Gulf state where such use would intimidate the rest, or against a key military base like Diego Garcia or Dhahran.

The United States would need excellent technical intelligence

and HUMINT to identify the source of the weapon. It would need real time intelligence to confirm the explosion, and its source, precise location and yield. Massive air and sea lift would be required to mount a rescue operation. A military-run effort would also almost certainly be required to ensure rapid repair of critical facilities.

The precise nature of U.S. retaliation is impossible to predict. It might include a need to react with a retaliatory strike against a nation the size of Iran designed to destroy its existence as a military or nuclear power and its basing ability to support its own or Soviet forces. Ideally, such an attack should be possible within no more than 12 hours of the attack on a U.S. ally or friendly state -- since delay could be politically paralytic. Weapons range, accuracy, reliability, and yield should support such attacks with a minimum of collateral damage.

Targeting and strike planning should be fully complete before the contingency arises. "Report back" on U.S. strikes should be in real or near real time, and characterize yield, height of burst, and place of burst within very demanding levels to ensure that collateral damage and the success of an attack can be characterized. The United States must again operate from bases, submarines, or carriers which have reasonable security. It must again face the prospect of escalation to limited nuclear war with the Soviet Union.

5) Soviet Quasi Transfer. Although no clear evidence of proliferation exists, and the state involved may be neutral or on the edge of civil war, the U.S.S.R. provides a large number of SS-22, SS-23, modern strike aircraft, and full NBC equipment. The prospect opens up of the U.S.S.R. using the armed forces of the nation involved as allies with the U.S.S.R. in an intervention which could become nuclear, to deliver nuclear weapons as a "proxy," or to serve Soviet interests in a conventional war which the U.S.S.R. would support with threats of nuclear intervention.

The end effect would be to confront the United States with the prospect that the RDJTF would confront a far larger force on the ground than the U.S.S.R. could deploy alone, and with far more capability to fight a theater nuclear war. In the case of Iran or Iraq, the United States probably could not meet the force planning requirement and would be forced to accept Soviet intervention or penetration to the Gulf coast. The United States would, however, want to be able to destroy bases and other key facilities conventionally, and to be able to project air and firepower deep into the region if this seemed likely to serve U.S. interests. It would then have to be prepared to fight at least a limited air war with the U.S.S.R., and to deter any transfer or escalation to nuclear conflict.

This scenario has some elements closely related to the position of Egypt after the breakdown of the ceasefire in 1973, or to what might happen in a divided post-Khomeini Iran.

The most important requirements for force planning are: 1)

excellent HUMINT and technical intelligence tailored to fighting complex nuclear wars; 2) near real time ability to locate and strike at nuclear weapons; 3) highly detailed pre-war strike planning for theater war and regional nuclear options; 4) long-range air forces which do not depend on forward bases; 5) a wide range of nuclear and advanced conventional strike capabilities to fight fairly intensive conflicts; 6) the ability to rapidly strengthen air and missile defenses in the area; and 7) the limited requirement for -- and credibility of -- large scale intervention on the ground. No requirement emerges for division-sized U.S. forces which would, in fact, increase U.S. vulnerability and limit U.S. freedom of action.

India-Pakistan Scenarios

The Indian subcontinent differs from the preceding area in that SNF proliferation could occur in the near term. U.S. strategic interests there essentially consist of limiting Soviet influence and ensuring the free flow of Gulf oil through the Arabian Sea and Indian Ocean.

1) India and Pakistan Engage in a Major Nuclear Arms Race. Changes in regime and internal tensions lead both nations to engage in a major nuclear arms race against each other. By 1995, both nations have significant nuclear forces.

The only U.S. requirement will be to defend its Gulf allies and facilities in the Indian Ocean area and to clearly decouple U.S. forces and interests from Pakistan in the event of a conflict with India. For humanitarian reasons, contingency planning for a post-exchange aid effort might be reasonable.

2) India and Pakistan Engage in a Nuclear War. Aside from humanitarian considerations, the result would be the same as in past Indo-Pakistani conflicts. The only U.S. objectives would be to 1) deter the U.S.S.R. from exploiting the situation; and 2) to prevent a nuclear or conventional Liberty incident in which the U.S. forces were attacked by either side.

3) "Trigger Force" Defense Against the U.S.S.R. India or Pakistan are confronted by a major threat or actual attack by the U.S.S.R., or possibly the PRC. They threaten or execute nuclear strikes on the U.S.S.R. (or PRC) designed to force the U.S.S.R. to strike against U.S. bases and forces in the area to make up for losses, raise the level of conflict to the point where the United States would be forced to threaten some form of intervention, and/or force the U.S.S.R. or the PRC to strike at the opposing communist state.

The United States would need strong nuclear forces and a wide range of credible LNO and RNO capabilities to both deter any Soviet action in response to the threat or reality of such "triggering," and a major regional ability to fight nuclear wars. Preventive U.S. strikes would not be credible.

While this scenario may seem improbable, it is important to note that a great deal of widely circulated French literature focusses on the "trigger force" aspects of small nuclear forces.

4) Diego Garcia Attack. For whatever reason, U.S. decoupling from an Indo-Pakistani conflict fails. India decides to preempt the threat of U.S. air support to Pakistan. It either threatens or attacks the key U.S. air basing and naval deployment base in the region.

This scenario highlights the increased value of a wide range of staging bases, rather than forward deployed and fixed site forces, in the 1990s. It also shows the imporance of using rapid deployment logistic ships and naval prepositioning, of runway flexibility in terms of airlift, and of being able to stage land based air operations far to the rear.

While it lacks political and military probability, it highlights the general need to avoid making any base a major nuclear target.

5) Afghan Border Attack/Soviet Invasion. After nearly twenty years of attempting to "pacify" Afghanistan, the U.S.S.R. decides it must halt all support to the rebels through Pakistan and, indeed, suppress all rebel bases near the Afghan border. It delivers an ultimatum, bombs all forward bases, or launches a major invasion. Pakistan replies by threatening nuclear attacks on Soviet forces and/or bases in Afghanistan.

This is the one type of scenario that might lead to U.S. military intervention in the subcontinent. Unlike the scenarios postulated for Iran, however, this scenario would allow the United States to extend deterrence in support of an ally. The ideal mechanism would seem to be advanced conventional air-delivered munitions backed by the threat of U.S. nuclear strikes to discourage Soviet attacks on Pakistan. These could suppress Soviet air and ground bases in Afghanistan or help Pakistani forces hold territory in Pakistan. They would also ease pressure to test Pakistan's willingness to use its nuclear weapons against the Soviet Union.

Such a scenario would, however, create the need for very long range and high performance bombers, for rapid fighter staging out of Pakistan, or some other long range delivery system. It would also require excellent near real time targeting and intelligence collection assets and excellent RNO/LNO capabilities.

6) Bomb Sale or Transfer. Pakistan or India might sell or transfer their nuclear weapons for a variety of reasons. In at least some cases, the United States could not accept the risk of such transfers or of having to try to launch preventive strikes once they were transferred.

Once again, excellent HUMINT and technical means would be needed to track the weapon. A long range and highly flexible "surgical" conventional strike capability would be needed to destroy the weapons

with minimum incremental damage.

Again, the key requirements are: 1) excellent regional intelligence; 2) long range conventional and nuclear strike capability: 3) freedom from dependence on a few fixed bases or staging points; 4) the ability to rapidly deploy large amounts of defensive and offensive air power; and 5) the ability to fight a wide range of BNOs, TNOs, and RNOs without having to delay to acquire the required options planning, targeting, and intelligence and damage assessment options. No requirement emerges for regular ground forces or Marine Corps units, although special attack helicopter, air defense, and advanced conventional munitions strike capabilities could be of great value.

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